

THE
VICTORIAN NATURALIST

THE JOURNAL AND MAGAZINE

OF THE

Field Naturalists' Club of Victoria

VOL. XLII

MAY, 1925, TO APRIL, 1926

Hon. Editor: **CHARLES BARRETT**

The Author of each Article is responsible for the facts and
opinions recorded

MELBOURNE:
RAMSAY PUBLISHING PTY. LTD., 203-5-7 KING STREET
1926

ILLUSTRATIONS:

	PAGE
<i>Adiantum, Lindsaya, Trichomanes</i>	303
<i>Ajuga australis</i> , R.Br.	198
Barnard, Mr. F. G. A.	33
"Bearded Dragon" or "Jew" Lizard	170
<i>Caleana nigrita</i>	183
Cockatoo, Young "Major Mitchell"	36
Corallum of <i>Thamnastraea sera</i> , Duncan	232
Cormorants, Rookery of White-breasted	118
<i>Cyatheaceae</i> and <i>Osmundaceae</i>	225
<i>Epacris Bawbawensis</i> , Stapf.—Alpine Heath	292
<i>Drakea elastica</i>	183
<i>Gleicheniaceae, Schizaeaceae</i> and <i>Salviniaceae</i>	242
Greenhoods, The "Striped" and the "Brittle"	62
<i>Hymenophyllaceae</i>	222
<i>Marsiliaceae</i> and <i>Ophioglossaceae</i>	264
<i>Myrmecia (Promyrmecia) aberrans</i> , Forel	136
<i>Notholaena, Davallia, Dennstaedtia, Hypolepis, Cheilanthes</i>	301
<i>Ocobius navis</i>	208
<i>Ophicardelus ornatus</i> (Fer.), <i>O. quoyi</i> (H. & A. Ad.), and <i>O. sulcatus</i> (H. & A. Ad.)	269
<i>Pimelea spathulata</i> , Labill.	198
<i>Pterostylis</i> , Seedling Plants of Some	190
<i>Pterostylis acuminata, P. rufa</i> and <i>P. pusilla</i>	144
Spider's Carding Machine, The	68, 69
Termites, Victorian	90
"The Stranger" Rock, Derrinal	102
<i>Wittsteinia vacciniacea</i> , F.v.M.—The Baw Baw Berry	292

ERRATA:

- Page 32, line 4 from bottom—"December, 1902" should read December, 1892.
- Page 184, line 19—For "another point," read anther point.
- Page 200, line 6—For *Considerniana* read *Consideniana*.
- Page 214, line 11 from bottom—For "englyphoides" read *englyphoides*.
- Page 238, line 18 from bottom—For "chat" read chert.
- Page 257, line 18 —For *Ricinus* read *Ricinocarpus*.
- Page 257, line 15—For *Hakeus* read *Hakeas*.
- Page 259, line 20—For *Culex* read *Pulex*.

The Victorian Naturalist

VOL. XLII.—No. 1.

MAY 6, 1925.

No. 497

FIELD NATURALISTS' CLUB OF VICTORIA.

The monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, April 20, 1925.

The President, Mr. J. Searle, occupied the chair, and about fifty members and friends were present.

CORRESPONDENCE.

From Hon. Secretary Australian Forests League, inviting this Club to join with the League in forming a deputation to the Minister of Lands to protest against the proposed alienation of lands in the Otway Forests area. It was proposed by Mr. F. G. A. Barnard, seconded by Dr. C. S. Sutton, "That the Club be represented on the deputation." Carried.

Messrs. C. Daley and F. G. A. Barnard were appointed to represent the Club.

REPORT OF EXCURSION.

A report of the excursion to Broadmeadows on April 18 was given by the leader, Mr. J. Wilson. He said that a party of members had walked to Gellibrand's Hill, over a circuitous route, noting interesting geological features. From the hill beautiful views of the surrounding country were obtained.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. W. H. Callister, 52 Alexandra Avenue, Canterbury, and Mr. and Mrs. Dwyer, 38 Brougham Street, Box Hill, were unanimously elected as ordinary members of the Club.

GENERAL BUSINESS.

Mr. C. Oke moved that the congratulations of the Club be conveyed to Mr. P. C. Morrison on his obtaining the degree of Master of Science in Zoology. Seconded by Mr. F. G. A. Barnard and carried.

Dr. Sutton mentioned that the Tree Lovers' League needed more members, and he asked the Club's help in gaining them.

PAPER.

By Mr. P. F. Morris: "The Need for Growing Softwoods for Paper-making." The author referred to the heavy importations of paper, and expressed the opinion that such paper should be manufactured in Australia. Experiments, he considered, should be conducted with native trees that were of little use as timber, to ascertain their value for pulping. Large areas might be planted with trees suitable for the production of paper pulp. The paper caused some discussion, in which Dr. Sutton and Messrs. F. Pitcher, F. G. A. Barnard, C. Oke and H. B. Williamson took part.

EXHIBITS.

By Mr. F. G. A. Barnard—Rocks from Derrinal, some striated.

By Miss E. C. Cameron—Brittle starfishes, belonging to the family *Ophuridae*, from Cowes, Phillip Island, Vic.

By Mr. C. Daley, B.A.—Samples of native timbers from Gippsland; also *Gaultheria hispida*, Waxberry, from Mt. Magnet, Tasmania.

By Mr. A. E. Rodda—Decomposed granite, from Gellibrand's Hill, collected on Broadmeadows excursion.

EXCURSION TO BALWYN.

Rain did not deter about a dozen members from meeting at Mont Albert Station on March 31; but it was decided to curtail the programme and visit only the newly-acquired reserve on the White Horse Road. On our way, via Mont Albert Road, to Maling's quarry, some of the features of the surrounding geography were pointed out, while Mr. P. R. H. St. John explained the reason for the presence of the many fine gum trees and pines of the district.

The quarry is of extraordinary interest, being situated on a fold, or anticline, which runs through to Templestowe and beyond. The folding was so intense at this spot that the rocks of mudstone (Silurian) were crushed and sheared so that secondary (metasomatic) changes took place, and numerous crystals of pyrites were formed. The pyrites (iron bisulphide) was subsequently dissolved out, leaving its cubical moulds scattered through the hard mudstone. In one place a large stack of the altered rock, standing out at the side of the pool, shows how the seamed rock, filled with

quartz veins, was squeezed and fractured almost to the extent of mylonisation. This broken and fissured rock would make an excellent subsoil for the planting of shrubs and trees, as proposed. This interesting geological site of one and a half acres has been generously given to Camberwell by Mrs. K. Maling. The mayor, Councillor A. E. Hocking, was prevented, by another engagement, from visiting the quarry on this occasion. He has already expressed his appreciation, and that of the Camberwell Council, of the Club's proposed effort to plant this reserve, when the ground has been prepared and the fencing completed. As the rain continued, the members adjourned to the leader's house, where, by means of microscope, specimens and books, much interesting discussion was elicited.—F. CHAPMAN.

PLANS FOR THE "NATURALIST."

With the authority of the Committee, I propose to make some changes in our journal—changes that depend for their success upon the co-operation of members with the Editor. Notes from the field and the study are desired, to fill several pages of each issue. Country members, especially, are invited to contribute from their stores of natural history knowledge.

Record your observations for the benefit of others. A paragraph may be made as interesting as a paper. Specialists could give us glimpses of their subjects—not general summaries, but notes that are "news" to the majority of nature lovers.

Hints for the novice, from veteran students and collectors, will be acceptable—brief paragraphs of the kind that helped to make "Science Gossip" popular. Indeed we might, with advantage, adopt other features of that delightful journal, whose passing was so keenly regretted. But a dozen more pages at least would be needed, and the present high cost of printing prohibits such enlargement of the "Naturalist."

If funds permit, our journal will be more freely illustrated. The aim is general improvement, though we are not so rich as we could wish, and perforce must hasten slowly towards the goal.

Space for nature notes will be gained by condensing reports of Club excursions. There rarely is a good reason for making the report of an afternoon outing, or even a whole-day one, lengthy, at least for publication. As a journalist one learns the value of "selection."

"The Victorian Naturalist," under Mr. Barnard's care, has not only become one of the leading publications of its class in the Commonwealth; it compares favourably with field club journals issued overseas. Yet there is room for improvement, and the plans outlined here are the fruit of a general discussion in committee. I shall be on trial as Editor during the next twelve months, and criticism will not be unwelcome.—CHARLES BARRETT.

SPARROW-HAWKS AT HOME.

By W. C. TONGE.

The home life of the Sparrow-hawk, *Accipiter cirrocephalus*, is not so well known as that of many other birds of prey. Last season (1924) I was able to keep a nest and its owners under observation, from "building-days" until the brood had ranged. The nest-tree—a Eucalypt—grows in a gully at Eltham Heights, close to my own paddock. The Sparrow-hawks built on a bough about 40 feet from the ground. The nest resembled that of a Magpie, but the egg-cavity was shallow, with a lining of green gum leaves.

On October 14 I climbed to the nest, and found in it three fresh eggs. On October 22, when the male Sparrow-hawk had been brooding for about two days, the nest contained four eggs. Two eggs hatched on November 19, another three days later; the fourth egg was infertile. The nestlings were covered in creamy down. Portions of the breast and head of a small bird, denuded of feathers, were lying in the nest on the day when I first saw the "twins," one of which was pecking at the food.

When the young birds were nearly fledged, about the middle of December, I climbed the tree to take a photograph. A nestling fluttered away, or was knocked off the nest by one of the parent birds. I replaced it; but the female hawk tried repeatedly to knock one or other of the youngsters off the nest with her wing. On December 18 the nest was empty when I "called": on the 20th, however, the brood was at home—three fine little Sparrow-hawks standing on the flattened nursery of twigs, sticks and leaves. When I saw them on December 23, brown streaks on the breast plumage were changing to bars; and, a few days afterwards, the young birds were scarcely distinguishable from their parents. They were hunting for themselves when five weeks old; on several

occasions I observed one with a bird, or portion of one, in its talons.

The parents were bold and aggressive. Disturbed at the nest, they flew around, uttering cries resembling notes of the White-plumed Honey-eater, *Meliphaga penicillata*, and others, not unlike the call of the Sacred Kingfisher, *Halcyon sanctus*. I noticed that, during the incubation period and while the brood was being reared, the female Sparrow-hawk's plumage became darker. Parents and young remained in the vicinity of the nest until the end of January; and I saw them about the paddocks often, for some weeks afterwards.

Several pairs of small birds nested in the neighbourhood of the Sparrow-hawks' home. A pair of Leaden Flycatchers, *Myiagra rubecula*, reared a brood of three almost in the shadow of the hawk-tree.

[Mr. Tonge is a keen observer, and his record of the home-life of a Sparrow-hawk family is a valuable page of bird biography. The Eltham district is fairly rich in birds. Mr. Tonge has listed more than one hundred species, and the most of them have nested at Eltham. —EDITOR.]

CHECK LIST OF AUSTRALIAN BIRDS.

The second edition of the Official Check List of Australian Birds, compiled by a special committee of the Royal Australasian Ornithologists' Union, will be published some time this year. Bird students will notice many changes in nomenclature. The iron law of priority has been observed meticulously, and the passing of some familiar Gouldian names must be lamented. The trivial names, too, have been under revision. Many of the changes made, doubtless, will be welcomed by bird lovers. The total number of species recognised is 703. The list is a bi-nominal one; but the host of sub-species described and named in recent years has not been ignored—all are listed as synonyms. Sub-species are the delight of many systematists; the average field naturalist is wisely conservative, and holds no brief for tri-nomials.

The new Check List will be indispensable to every student and observer of Australian birds. For many years it must remain the standard; though all the committee's "findings" may not meet with general approval. The preparation of the List has entailed much work, including study of the literature, examination of specimens in State museums and private collections, and the compilation of a full synonymy.

NEW AUSTRALIAN COLEOPTERA.

(PART I.)

BY CHARLES OKE.

(Read before the Field Naturalists' Club of Victoria,
9th March, 1925.)

SCARABIDÆ.

APHODINÆ.

Aphodius dixonii sp. nov.

M. Black; under-surface diluted with red; front and lateral margins of prothorax and elytra (its markings excepted) flavous; legs reddish, in parts infuscated. With short, pale, sub-erect hairs, thick on front of head and margin of elytra, sparse elsewhere; prothorax with a conspicuous fringe of longer hairs. Head, prothorax and scutellum sub-nitid; elytra sub-opaque. Head with elevated margin, incurved to middle; base impunctate, in front and clypeus strongly and coarsely punctate. Prothorax transverse (3 x 4) irregularly punctured, a faint median line on basal third, front angles slightly produced, hind obliquely rounded. Eyes opaque, distinctly faceted. Elytra with minute punctures and very fine striae; the odd interstices evenly elevated, the even ones wider and flat. Scutellum sparsely punctured. Anterior tibiae bi-dentate on the external edge.

F. Similar. Prothorax with median line more strongly impressed and longer; hind angles strongly notched out. Front tibiae tri-dentate. Length, 6½ m.m.

Hab. Victoria: Lake Hattah (J. E. Dixon and C. Oke), in stereo.

A variable species in the markings of the elytra; some specimens having most of the elytra black, but not suture or apex. Most have about half of elytra dark. One specimen has a small black spot on middle of fourth interstice, and three small, faint infuscate spots on apical third.

Apparently nearest to *callabonnensis* (Blkb.) of the described species, but with sexual characters different. I cannot detect any difference in the puncturation of the pronotum in the **M.** and **F.** The puncturation of this part is very uneven in size and distribution in both sexes.

I have much pleasure in naming this sp. after my friend, Mr. J. E. Dixon, who has taken numerous specimens of it on several visits to the locality.

Types in author's collection.

PSELAPHIDÆ,

Sagola helene, sp. nov.

m. Reddish, castaneous, elytra and legs slightly paler, palpi flavous; clothed with moderately long yellow setæ, a few longer hairs intermingled, thicker on apex of elytra and on abdomen. Head small, with a deep foveate impression in front, connected with cut through anterior margin; a few large punctures, closest on antennal tubercles. Eyes large, prominent. Antennæ reaching apical third of elytra; first joint nearly as long as next three combined, second moderate, third small, fourth to eighth sub-equal, ninth and tenth slightly larger, eleventh ovate, one and a half times as long as tenth. Prothorax cordate, lightly transverse, wider than head, with sides strongly rounded and widest at middle, with a strong impression near base connecting three foveæ, of which the median one is the largest and slightly in advance of the others, and with an oblique lateral impression near base. Elytra longer than wide, each elytron with a small fovea at base of sub-sutural stria and another behind it; dorsal stria represented by two foveæ, a small one at base, and a larger one behind it; a round fovea at base between sutural and discal striæ; a row of punctures near lateral margin; a curved double row of punctures on epipleuræ. Abdomen longer than elytra, dilated to fourth segment, with a few scattered punctures; under-surface with a large round depression common to fifth and sixth segments, a small split granule at bottom. Front trochanters minutely bi-dentated. Length, 2.25 m.m.

Hah, Victoria: Evelyn in June (C. Oke).

This genus, so numerous in New Zealand, has not been recorded from the mainland of Australia. Mr. Lea has described one species from Tasmania, from which the present species differs (by description) in foveæ of the under-surface of abdomen, by the front trochanters being armed, and the hind ones not armed, and the impression on head not being continued to base.

Type in author's collection.

Sagola victorivæ, sp. nov.

Reddish castaneous, disc of elytra, legs (knees excepted) and palpi paler, clothed with long, yellowish setæ, a few longer ones intermingled. Head rather small, with two small medio-basal foveæ, and deeply impressed between antennal tubercles, ending in a foveate expansion between eyes; the latter large and prominent; sparsely punctured. Antennæ

reaching middle coxæ, first joint large, as long as next two combined, second same thickness as first, third small, fourth to sixth sub-equal, seventh to tenth trapeziform, eleventh ovate, slightly acuminate. Prothorax cordate, slightly longer than wide, widest at middle, sides strongly rounded, with a wide tri-foveate impression near basal third, the centre dilated forward; the sides with an oblique impression; a large, round foveæ at base. Elytra quadrate, with scattered rough punctures; discal striæ widely impressed to beyond middle; base with several small, indistinct foveæ. Abdomen a little dilated to fourth segment; under-surface slightly flattened. Legs apparently unarmed. Length, 2.60 mm.

Hab. Victoria: Belgrave, Macedon, Daylesford (C. Oke).
Types in author's collection.

Sagola brevipennis, sp. nov.

M. Reddish castaneous, elytra lighter, tip of abdomen and palpi flavous. Head widely and deeply impressed between antennal tubercles. Antennæ shorter and thicker than in preceding species, with the joints 4-5-6 more globular, and 9-10 shorter and more transverse. Fourth joint of palpi sub-fusiform. Prothorax cordate, sides rounded, widest about middle, where width is equal to length, with a sub-basal tri-foveate impression; with very fine punctures. Elytra short, transverse. Abdomen dilated to fourth segment; under-surface with a narrow, transverse impression, on fifth and sixth segments. Length, 2.85 mm. (Abdomen distended.)

Hab. Victoria: Belgrave (C. Oke).

Impressions on elytra as in *victoriae*, but the elytra are much shorter, the body narrower, and the antennæ shorter.

Types in author's collection.

Sagola formicicola, sp. nov.

N. Castaneous, legs and palpi lighter; clothed with pale and rather short fine pubescence. Head small, with a foveate impression in front, and two small medio-basal foveæ. Antennæ not quite reaching middle coxæ, first joint longer than next two combined, third small, thence gradually increasing in size to apex, ninth and tenth transverse, eleventh irregularly ovate. Prothorax with sides rounded and constricted near base, with a transverse tri-foveate impression, dilated forward in centre. Elytra lightly transverse; with a large impression at base of sutural striæ, discal striæ represented by two impressions, a small one at base and a larger one behind it. Abdomen very gently dilated to fourth segment, which is long; under-surface somewhat constricted before

apex, the apex itself slightly produced. Legs unarmed. Length, 1.20-1.30 m.m.

c. Similar, but under-surface of abdomen evenly convex to apex.

Hab. Victoria: Fern Tree Gully in nest of *Amblyopone australis* (C. Oke).

Distinguished by its small size and its pale, almost ashen and short, pubescence.

Types in author's collection.

Rybuzis sternalis, sp. nov.

♂. Dark castaneous, elytra and legs reddish castaneous, palpi flavous, clothed with short, pale pubescence. Head longer than wide, with two large round interocular foveæ, and a small one behind; in front of foveæ rather coarsely punctate, behind smooth; nitid. Antennæ long, very irregular; first joint stout, longer than next two combined, second same length as third, but stouter, fourth longer, cylindrical, fifth longer than fourth or sixth, irregularly widened on its inner edge, sixth slightly longer than fourth, cylindrical, seventh slightly shorter but wider than sixth, irregularly widened on its inner edge, eighth smallest, quadrate, ninth same length as fourth, nearly as wide as long, tenth longer than ninth, transverse, eleventh ovate, not quite as long as ninth and tenth combined, with a small appendage on lower surface. Prothorax transverse, convex, sides strongly rounded, the lateral foveæ connected by a well-defined curved impression, somewhat expanded in middle, striolate in front of impression, with a few punctures near apex and sides, behind smooth. Elytra lightly transverse, slightly attenuated to base; sutural and discal striae distinct, the latter lightly curved and diverging, deep at base and vanishing near apex, each elytron produced at middle of apex; punctures fine and indistinct. Abdomen with a small, transverse impression at base of first segment, and two striae close to sutural striae at base, but diverging and vanishing before apex of segment; under-surface with a small plate on edge of second segment, this segment produced, in centre, over apex of third segment. Metasternum deeply sulcate, on each side of sulcus with a large protuberant tubercle. Four front trochanters strongly dentated; front femora inflated and with a small tooth nearer base than apex; front tibiae sharply dentate at apical third, and somewhat excavated from there to apex; posterior tibiae lightly inflated and compressed to apex, near apex notched, and with a paral-

1st spur, invisible from most directions. Length, 2.70-2.50 mm.

c. Differs in having shorter antennæ, and the fifth and seventh joints not widened as in the male, but showing a slight trace of it; and metasternum, abdomen and legs not armed.

Hab. Victoria: Benconfield, in grass: Evelyn, in moss. (C. Oke.)

In appearance very like *strigicollis*, but under-surface and legs different. In many respects close to *mirabilis*, but sternum and legs of that species, apparently, not armed. The present species has an additional fovea on head, and a single plate on abdomen, and its apex not excavate. The abdominal plate is rather narrow, lightly overhangs the third segment, and is bent back, with its free edge, which is rounded, directed cephalad.

Types in author's collection.

Nurcodes crassus, sp. nov.

n. Dark reddish castaneous, much infuscated in parts, abdomen nearly black, palpi lighter; with pale subsquamose clothing, darker in patches on abdomen; densely punctate. Head transverse, with two interocular foveæ, and the front widely impressed, and continued between antennal tubercles, which are conspicuously raised; hind angles produced. Antennæ reaching beyond middle coxæ, first joint stout, longer than second and third combined, second shorter and stouter than third, third to fifth sub-equal, sixth to eighth decreasing in size, ninth longer, not quite as wide as long, tenth quadrate, eleventh ovate, not quite as long as ninth and tenth combined. Prothorax distinctly transverse, sides rather strongly rounded, with a shallow medio-basal fovea, and a foveate impression on each side. Elytra short, dilated to apex; sutural and discal striæ distinct, the latter widely impressed at base and continued to near apex. Abdomen dilated to third segment, declivous from second, with wide margins; under-surface with a large round excavation, common to second and third segments, and slightly encroaching on fourth; the ultimate segment somewhat produced and bi-impressed. Metasternum deeply sulcate, the sides of sulcus finely carinate; with a lamelliform protuberance at its base, between the hind coxæ, at right angles to the body, its lower edge concave. Front trochanters bi-dentate, all the femora are somewhat inflated, and constricted near apex, the anterior

ones with a sharp tooth near base; all the tibiae curved, and obtusely armed at apex.

1. Similar, but metasternum only flattened in middle and abdomen convex on under-surface. Length, 3.25-3.35 m.m.

Hab, Victoria: Grampians (G. Oke). In moss.

A large, robust species, distinguished from *eclatomma* (by description) in prothorax not having flattened and armed sides, discal striae continuous to apex, and metasternum. The latter, when viewed obliquely from behind, appears to have two wedge-shaped teeth with their bases joined together, but when viewed from in front it appears to have a small plate with its outer edge gently concave. On this and the following species there is a small tubercle on the clypeus (?) overhanging the front of the head.

Nurcodes vulgaris, sp. nov.

M. Black, or almost so, head antennae (club black) and pronotum dingy brown, elytra and legs (knees infuscated) reddish, palpi flavous. With golden subsquamose clothing, longer at apex of elytra and two rows down abdomen than elsewhere. Head lightly transverse, with two shallow interocular foveae, and a deeper one in front; hind angles produced downwards into an obtuse point; with coarse, dense punctures. Antennae passing middle coxae, first joint stout, as long as two and three combined, second stouter and much shorter than third, third to eighth decreasing in length, ninth one-third longer than eighth and not much wider, tenth a little shorter, quadrate, eleventh ovate acuminate, as long as ninth and tenth combined. Prothorax as long as wide, a shallow medio-basal impression, and a smaller but deeper one on each of the declivous sides, front angles widely rounded off, with punctures as on head. Elytra distinctly transverse, dilated posteriorly; sutural and discal striae distinct, the latter widely impressed, and continuous; punctures much as on head. Abdomen with second and third segments dilated posteriorly, fourth parallel-sided, fifth and sixth decreasing; punctures somewhat finer than on elytra; under-surface with a large excavation, common to second, third and fourth segments, these segments also transversely impressed, the second having a fairly wide impression, the third narrower, and the fourth very narrow, the impressions smooth and nitid. Metasternum excavate and densely punctate. Front trochanters bi-dentate, teeth equal; all the femora somewhat inflated and constricted near apex, front femora with a short, sharp tooth at base: four

front tibiae curved, and obtusely spurred at apex, hind tibiae less curved and unarmed. Length, 2.6-2.5 mm.

P. Differs in having antennae slightly shorter, metasternum not so excavate, and abdomen slightly convex on under-surface.

Hab. Victoria: Ringwood, Pakenham, Killara, Warburton, Evelyn (C. Oke); Fern Tree Gully (J. E. Dixon and C. Oke), Mitcham (E. Nye).

A common species in grass tussocks. Close to description of *nigriventris*, Lea, but intermediate trochanters not armed, and under-surface of abdomen deeply excavated.

Emesiphorus camponoti sp. nov.

M. Dark castaneous, elytra and legs lighter, clothed with short, depressed golden pubescence; a fascicle of hairs on each side of under-surface of head behind each eye. Head with two moderate interocular foveae, front longitudinally impressed between antennary ridges; densely punctate all over. Antennae reaching middle coxae, robust, first joint stout, as long as next two combined, second stouter but same length as third, third to fifth sub-equal, sixth to eighth smaller sub-equal, ninth as long as two preceding, sub-quadrate, tenth slightly shorter but wider than ninth, eleventh irregularly ovate, one and a half times as long as ninth. Prothorax a little longer than wide, widest at apical third, sides rounded; with a shallow round medio-basal fovea, and a deeper one on each side; punctures as on head. Elytra wider at apex than length, moderately narrowed at base, sutural striae fairly distinct, discal striae widely impressed at base, vanishing at apical fourth, shoulders somewhat raised; punctures a little finer than on head. Abdomen a little longer than, but same width as, elytra, punctures as on elytra: under-surface slightly flattened, apex produced a little. Legs long; four anterior tibiae curved, hind almost straight.

F. Differs in having joints nine and ten of antennae same length, and under-surface of abdomen less flattened, and apex not produced. Length, 2.36-2.92 mm.

Hab. Victoria: Lake Hattah (C. Oke), in nest of *Campionotis nigricaps*.

Belonging to the division of the genus not having a spine behind the eye. Close to *curvipes*, Lea, but no basal impression on head, antennae not reaching hind coxae, prothoracic fovea different, and no impression on under-surface. The base of the abdominal segments only are flattened, the apex of each being normal.

Types in author's collection.

Chalcoplectini, tribus nov.

Body long, depressed. Mouth parts well developed. Maxillary palpi normal, of four joints. Intermediate coxae sub-globular approximate, posterior triangular, distant. Anterior and intermediate trochanters long; posterior short. Tarsi with first joint rather short, second large and dilated, third longest, and inserted on the base of the second. Two well-developed claws. Other characters as in the single genus, *Chalcoplectus*.

The insect for which this tribe and genus are proposed shows a rather peculiar combination of characters. The shape of the body, and, to a certain extent, the mouth parts, are suggestive of the *Paronini*, and its tarsal joints are somewhat as in the anterior tarsi of *Exeirarthra*, Brown, from New Zealand, but are the same on all legs. The antennae, intermediate trochanters, and the inner claw of anterior tarsi being trifid, are very much as in *Palimbolus* (*Tyrini*), but the tarsal joints and body, inter alia, would exclude it from the *Tyrini*.

The intermediate trochanters are only comparatively long; that is to say, they are longer than those found in genera known to me, belonging to the *Brachyseelides*, and have been compared with the following genera:—*Sagola*, *Euplectops*, *Macroplectus*, *Plectostenus*, *Mesoplatus*, *Batrissodes*, *Batraxis*, *Briara* and *Rybaxis*. They are not as long as the corresponding parts in *Pselaphus*, *Pselaphophus*, *Tyraphus* and *Ctenisophus*, but are as long as in *Narcodes*, and some of the genera of the *Tyrini*. According to M. Raffray's classification of the family, this tribe would follow *Tyrini*, before the *Schistodactylini*, as it is obviously a stage before the bilobing of the second tarsal joint.

Chalcoplectus, gen. nov.

Body long, depressed. Head sub-quadrate. Eyes large, coarsely fascetted, prominent, situated a little behind the middle. Antennae eleven-jointed, first joint large, club three jointed, bases distant. Labrum broad and transverse, its edge ciliated. Mandibles with basal portion thick, the apical portion abruptly curved inwards, elongate and acuminate; inner edge denticulate. Mentum large, not transverse. Maxilla well-developed, with the lobes distinct; the cardo somewhat triangular, and finely carinated on its external edge; its palpi large, four-jointed, first short, strongly curved; second long, thin at base, clavate at apex, bent outwards; third joint shorter than second, slightly longer than fourth, a short

peduncle and strongly clavate, the latter not quite as broad as the second, fourth joint ovate, with a very short peduncle, apex with a minute membranous appendage. Prothorax cordate, tri-foveate. Elytra short, with discal stria. Abdomen long of six segments in M. and seven in F.; first short, invisible, second and third large, sub-equal, fourth largest of all; strongly margined. Mesosternum short, metasternum long. Legs rather long. Anterior coxæ conical, prominent, contiguous; intermediate globular, almost level, approximate; posterior triangular, widely separated. Anterior trochanters decidedly long; intermediate long, posterior short. The femora lightly inflated, and obliquely inserted on the trochanters. Tarsi with first joint rather short, second longer and dilated, with the third inserted on its base. Anterior tarsi with inner claw trifid in the M., slightly thicker than outer in F.; other tarsi with two well-developed equal claws.

Chalcoplectus depressus, sp. nov.

M. Castaneous, elytra and legs paler, palpi flavous; sub-nitid; with long, pale pubescens. Head very lightly transverse, with rather coarse reticulate punctures; widely hollowed between antennal tubercles, and continued back to level of front margin of eye, where there is a round fovea, and with two interocular foveæ. Mandibles tri-denticulate. Antennæ long; first long and stout, as long as next three combined, second a little longer and broader than third, fourth to eighth sub-equal, ninth large, sub-quadrate, tenth larger, lightly transverse, eleventh ovate, as long as nine and ten combined. Prothorax about as long as the width at its widest, which is at apical third, in front suddenly narrowed to apex, and irregularly narrowed to base; a round discal fovea at basal third, and an oblique foveate impression on either side; punctures as on head. Elytra transverse (as 4 to 5), attenuated to base; each elytron with distinct sub-sutural stria with a round fovea before base; distal stria widely and obliquely impressed with a fovea at base; punctures fine and indistinct. Abdomen long, three first (visible) segments widely margined; with a short simple carinule on either side of basal segment, rather near the margin, punctures much as on elytra. Metasternum lightly impressed and excavated posteriorly, sparsely punctured. Under-surface of abdomen with a few large punctures, and fifth segment transversely impressed. Intermediate trochanters with a triangular tooth, posterior trochanters with a

strong, rounded tooth. Femora inflated in middle, tibiae somewhat curved. Length, 2.75-2.85 m.m.

r. Differs in not having abdomen impressed, and trochanters not armed.

Hab. Victoria: Belgrave, Evelyn, Bacchus Marsh, Coburg (C. Oke), Fern Tree Gully (J. E. Dixon and C. Oke) Mitcham (Rev. E. Nye), Mooroolbark (E. Fischer). Found at base of grass tussocks.

The insect, when alive, is rather suggestive of a Staphylinid, more especially in the manner in which it runs.

CUCUJIDÆ.

Cryptomorpha lata, sp. nov.

Dark piceous brown, tarsi paler, clothed with moderately long, erect hairs. Head transverse, excluding mouth-parts, with large rugose and confluent punctures; eyes prominent. Antennæ reaching hind coxæ, first joint long and stout, longer than next two combined, second small, third a little longer, fourth to eleventh long sub-equal, eleventh acuminate. Prothorax as wide as long, convex, with the front angles produced, the produced part rounded; with a feebly-raised median ridge. Elytra with the striae coarsely crenulate-punctate, and the interstices finely punctured. Femora moderately inflated. Length, 5 m.m.; width, 2 m.m.

Hab. Victoria: Bendigo, Gypsum (C. Oke), Inglewood (J. E. Dixon and C. Oke), Kiata (F. E. Wilson), Maldon (J. C. Goudie).

A broad, distinct species, wider than any of the described ones. Most of the specimens are of a dull red-brown about the base of thorax and base of elytra, others being darker there. The Kiata specimen is more or less of this colour all over.

NOTES ON BEETLE LARVÆ.

By C. OKE.

How little is known regarding the habits of our beetles! Approximately, 15,000 species have been described from Australia, and the complete life history of none has been published yet.

It is known where many of the Buprestids, Longicorns and Chafers breed. The larvæ of water-beetles are easily obtained, and it should not be difficult to rear some species. A few of the Weevils breed in certain foodstuffs, but their life-histories have not been worked out in detail. Carab

larvæ are familiar—as Carab larvæ; but who can identify one with certainty? Staphylinid larvæ are not often seen, and “in captivity” they soon die.

There are numbers of species—even whole groups—that are quite unknown as larvæ and pupæ; for instance, the large Weevils belonging to the *Amnecorine*, a sub-family confined to Australia, with a considerable number of species. We do not know where they breed. Again, the family *Pselaphidae* has more than 400 described Australian species, and the larva of none has been found.

Unfortunately, beetles are, as a rule, difficult to breed out; they require conditions not easily supplied, and time and patience must be devoted to them. My attempts often have proved futile. I collected two Chafer grubs, about an inch in length, and thought to rear them without trouble. The larvæ of these Chafers live in damp soil, and eat grass-roots. I kept my specimens in a tin of damp earth, and provided fresh clumps of grass at regular intervals. More than two years elapsed before one larva pupated; the other had died. Beetles do not, usually, live long as pupæ, but soon “turn” or emerge from the pupal skin, though the emergence is gradual. The colours of maturity, and “hardness,” are not attained for some time—several months in some cases.

My Chafer grub, which had survived, half-emerged from the pupal skin, assumed a light-brown colour, and then died. It was a *Dasygnathus*, and, had it lived, would have been almost black. At the present time (May, 1925) I am feeding a large Click-beetle larva on termites, which appear to be its natural food. I obtained this specimen in the Mallee last November, and think it will prove to be *Tetrolobus fortnumi*. I may be wrong as to the species, but am sure of the genus, as I have bred another species, *murrayi*. It is only after rearing, or trying to rear, a few beetle larvæ, that one realises how many are killed by parasites. When a grub has been kept for some months it is annoying to find a parasite in the breeding-box.

I am unable to give definite accounts of the breeding habits of the beetles described in preceding paper. The life histories of the *Pselaphidae*, to which family most of my species belong, are still “ungarnered grain.” As beetles, those described live in mosses and grass-tussocks. Other species live among rotting leaves, under bark, or clinging to logs and stones; while a fair number of species are found only in

ants' nests. In fact, they are generally regarded as ants'-nest beetles; but of the 160 species I have collected in Victoria, fewer than 40 were found in association with ants; while only one was among termites.

The species of *Aphodius* live in dung, and burrow through it in all directions. I do not know whether they eat it or not, in the mature stage, but they form little hollow pellets of the unsavoury material, and lay their eggs inside. The larvæ feed upon the walls of their cells, pupate, and, in due time, force their way to the outside world.

The various species of *Cryptomorpha* are mostly found in, or on, dead leaves; and I believe their larvæ are unknown. Other members of the family, *Cucujidae*, have very peculiar larvæ. That of *Isophes bicolor*, $1\frac{1}{2}$ in. in length, and no thicker than a shilling, has a peculiar process on the end of the abdomen. These larvæ live between the outer and inner bark of the Eucalypts, hence their flattened form.

CONCERNING "CUSHION" PLANTS.

The Andean and sub-Antarctic American floras have a special interest for us on account of their close kinship with those of Australia and New Zealand, and the short account, by R. W. Pennell, in the last Annual Report of the Academy of Sciences of Philadelphia, of a botanical expedition to the Andes makes one eager for the detailed description, which doubtless will be published in due time.

Mr. Pennell, who is a member of the scientific staff of the Academy, was chiefly concerned in the vegetation of the high plateaus, or *paramos*, corresponding to the fell fields in northern countries, and the *punas*, or Alpine deserts, of Western Colombia. The *paramos* are isolated areas, at very high altitudes, as much as 17,000 feet, or even more, whose plant cover is characterised by the presence of various curious composites, belonging to several genera, and locally known as *frailejones*, associated with scattered herbs of rosette, tufted or "cushion"-growth forms. Each *paramo* seems to have evolved a *frailejon* peculiar to itself. The plants vary in height, up to 10 feet, and are densely clothed with silvery or golden hairs or soft wool. In the case of *Espeletia grandiflora*, which is about 6 feet in height and unbranched, there is also, below the inflorescence and upper leaves, an investment of dead leaves as thick as a man's body.

Of the "cushion" plants, Mr. Pennell writes:—" . . . but denser colonies were formed by an Alpine plantain and by certain composites and monocotyledons. One of the last, growing at the edge of pools in the valley's head, forms rounded coralline cushions of almost rock-like hardness, and with the outline as precise as any pattern. Although its short leaves projected vertically, and one walked on the leaf-tips, these were so rigid and strong that no impress from the human foot could be detected."

Dr. Robert O. Cunningham, in his "Notes on the Natural History of the Strait of Magellan and West Coast of Patagonia," had the same experience with the famous balsam-bogs (*Bolax gymnanthera*), which he found so compact in their structure that he was able to jump on them without leaving the print of his feet.

Even stronger proof of their hardness is given by Dr. Reiche in his "Chilenflora" (Engler's Veg. d. Erde), regarding the cushions of *Azorella madreporica*, another Umbellifer closely allied to the *Bolax*, which are "so hard and solid a mass that if one fires a revolver at them the ball glances off, being quite unable to penetrate it." Skottsberg in "A Botanical Survey of the Falkland Islands" also refers to their extreme hardness.

"Cushion" plants, or those with a closely-knit scheme of branching assuming a rounded shape, occur, of course, in all parts of the world, but the very hard "cushions," better called "boulder" plants, with few exceptions (such as *Draba alpina* from Cape Chelyuskin, in the far north of Siberia, about the size and shape of a small apple and not very close and compact) appear to be confined to the southern hemisphere. Moreover, they range only down the Andes, through Tierra del Fuego, the Falkland Islands, Kerguelen Island, the sub-Antarctic Islands, New Zealand and Tasmania, occupying, in fact, the remnants of the causeway by which came, in all probability, the ancestors of the Antarctic element in our flora. It is the presence in our part of the world of this extraordinary growth form and its distribution that adds to the significance of the kinship between our flora and that of South America, and, with similar distribution of other forms of life, affords strong evidence of a once-intimate land connection between the two regions.

Some reference has already been made to our "cushion" plants, and their hardness, in a short description of the Cradle

Mountain Flora, with a picture of one of them, *Eurytia Meredithae*, and a general view of the "cushion" plant association.—Vic. Nat. XL, No. 7, Nov., 1923. Four species were mentioned as growing there, and a fifth as occurring elsewhere in the island. A sixth might have been added, *Gaimardia Fitzgeraldii*, one of the Centrolepids. In New Zealand these forms are much more numerous. The composites here afford at least nine examples, of which six are *Raoulia*s, including the celebrated vegetable sheep, *R. bryoides* and *R. erimiae*, a *Haastia* and two *Celmisia*s. The *Stylidiaceae* have a *Phyllachne* and a *Donatia*, which is identical with the Tasmanian plant. The *Epacrid*s are represented by a *Dracophyllum*. A *Gaimardia* is perhaps confined to the Stewart and Auckland islands, this and an *Oreobolus* (*Cyperaceae*) being rather smaller than the others. A *Colobanthus* (*Caryophyllaceae*) extends throughout the Southern Islands, and *Azorella selago* is only in Macquarie Island, but this finds a place also in Kerguelen and other islands, as well as Patagonia. This perhaps completes the list, though Dr. Cockayne speaks of 55 species of "cushions" or "semi-cushions" of 22 genera in 14 families.

In Andean and sub-Antarctic America there are probably more species growing in hard-"cushion" form than are known in New Zealand, but at present we have no means of ascertaining definitely. It would appear, however, that, although the members of many families have thus shown their ability under stress of circumstances to assume this very convenient form, and have come to resemble one another so closely, the composites, at least at this, and the Umbellifer at the other end of their range, seem to provide the greatest number of examples.

Ensuring almost absolute stability, comparative evenness of temperature, protection against desiccation, reduction of transpiration to the minimum, and enabling the plant to take complete advantage of its dead parts for its own nourishment, this growth form must make for extreme longevity, and is an adaptation to a particular and extreme set of conditions perhaps more perfect than can be found elsewhere in the vegetable world.

NOTES FROM FIELD AND STUDY

[Members are invited to contribute paragraphs for this section of the *Naturalist*, which should become a popular miscellany. Original notes, of course, are most desired; but gleanings from scientific literature, unlikely to be seen by the majority of members, will also be welcomed.]

GANG-GANG COCKATOOS AS BERRY-EATERS.

The seeds of Eucalypts are eaten freely by Gang-gang Cockatoos (*Callocephalon fimbriatus*), but it may not be generally known that these birds have a strong liking for "haws," and often rob the hedgerows of their autumn glory. When I was at Wandiligong, in April last, Mr. W. Goldsworthy, J.P., a close observer of bird life, told me that Gang-gangs came every year to reap the harvest of Hawthorn berries. In March or April, as the "haws" ripen the birds appear, in small flocks; and when they depart there are no clusters of crimson fruits along the hedgerows. The Cockatoos seem to work systematically, stripping one "section" at a time. Thus they move round the district, leaving, at last, in quest of another harvest. They may not be seen in the valley again until autumn once more is preparing the "feast of haws" for them. When feeding, the birds display little fear of man. In Bright, where the Hawthorn grows, one may walk beneath the Gang-gangs at their meal. The local name for this species is "Grey Galah," favoured also in other districts.—C.B.

BEETLES AND ANTS.

In a North-Western Mallee district I devoted some time to collecting at night, with the aid of an acetylene lamp. Around the butts of trees many examples of the beetle, *Liparocheilus gemmatus*, Westw., belonging to the sub-family Trogides of the Scarabæidæ, were secured (probably one hundred or more were noticed). In all cases they were in the midst of columns of small black ants that were travelling backwards and forwards. I watched carefully, but did not once see a beetle interfered with by the ants.—F.E.W.

In the Fitzroy Gardens one day I saw a rat run across a path, and beneath some shrubs close to the artificial pond. A few minutes later a Kookaburra (*Dacelo gigas*) darted from a bough above the shrubs; followed fluttering and rustling in the undergrowth, then the bird emerged with the rat firmly held in its beak, and flew off among the neighbouring trees.—L. L. HODGSON.

PUPATION OF THE CONVULVULUS HAWK-MOTH.

At Murchison, on March 21, I collected two caterpillars of the *Convolvulus* Hawk-moth, *Protoparce convolvuli*. They were feeding on *Convolvulus* leaves, and were almost full-grown. I placed them in a breeding cage, and supplied them regularly with "Morning Glory" leaves. The larger of the two specimens ceased feeding on March 28, and shortly afterwards became exceedingly active. It would crawl about for 10 or 12 minutes, then suddenly becoming motionless, remain stretched on the bottom of the cage for about the same length of time. It had lost its beauty, being of a yellowish colour, while the distinctive stripes had become faint. On the 29th this caterpillar was still subject to restless moods, alternating with periods of complete repose. Sometimes it would bury itself in the loose soil and debris covering the floor of its cage, having longer periods of inactivity than formerly. It was much shrunken in appearance now. On the 30th it was very active at intervals, but was unable to climb. It was of a uniform, dirty brown colour; the stripes had completely disappeared, and it measured only 1.6-8 inches in length. Restlessness, with intervals of repose, continued until April 8, when the caterpillar pupated.

On April 1 the other caterpillar ceased to eat, and behaved in exactly the same way as its fellow, until April 13, when it pupated. I failed to find traces of a cocoon, or fastenings of any description. These Hawk-moth caterpillars, apparently, do not spin. The larval skin splits completely, at the head. The pupa, shortly after emergence, is very prettily coloured, the head and thorax being light green, merging into yellow towards the tip of the abdomen, which is bright red. The green and yellow gradually fade until, two days after pupation, the pupa is of a uniform rich-chestnut colour.—H. W. DAVEY.

BIRD ENEMY OF EMPEROR GUM MOTH LARVÆ.

Some Eucalypts in my garden at Darling having been topped, young growth attracted many Emperor Gum Moths, *Antheraea eucalypti*, which were seen ovipositing on the tender shoots just before nightfall. The larvæ of this moth are voracious, and very soon branches were completely defoliated. Many of the caterpillars, about this time, were half-grown. Then a pair of Black-faced Cuckoo-shrikes, *Graculus melanops*, arrived in the garden, and commenced to prey upon the larvæ. My trees were "cleared" in three days. As the most of the larvæ were on twigs too small to support the birds, they were taken "on the wing." A Cuckoo-shrike would perch on a branch of a taller tree nearby, and gaze intently down upon the infested tree, until a larva was located, when the bird would swoop and deftly remove the caterpillar without alighting. If, as happened occasionally, a miss was "registered," the bird would turn gracefully in its flight, hover over the twig, and secure its prey.—F. E. WILSON.

CARNIVOROUS LAND SNAILS.

The finest Victorian land shell is that of *Paryphanta atramentaria*, Shutt, and its tenant is a most interesting snail. Last year I sent two specimens to Mr. Hugh Watson, of Cambridge, England, a brilliant anatomist, who specialises in terrestrial mollusca. He returned a mounted radula, with a note: "This snail, *P. atramentaria*, has a fine radula, as you will see. It is of the specialised type, found only among the carnivorous genera. . . . *Paryphanta*, of course, like most carnivorous snails, has no jaw." The radula is a beautiful object, under the microscope. Before I was aware of this snail's true nature, I enclosed a live one, with two specimens of *Helicarion cuvieri*, Fer., in a small collecting tin. *Paryphanta* devoured its fellow-prisoners, and spoiled their delicate honey-coloured shells.—C.B.

SOCIAL LIFE IN THE INSECT WORLD.

Intensive study of the habits of Australian ants, wasps and bees should be undertaken. New species are being described; but there are very few workers in the vast field. Behaviour. After reading Professor W. M. Wheeler's "Social

Life Among the Insects," and other recent books of the kind, one realises the need for systematic observation of even our most "familiar" species. In Europe and the United States of America, the study of insect behaviour has attracted many distinguished naturalists. Books on ants and wasps are nearly as popular as those dealing with birds and wild-flowers. Some contain references to Australian species; and the deep interest attaching to our insect fauna is realised, especially in America. The veteran Myrmecologist, Auguste Forel, has devoted five volumes (published 1921-23) to a fascinating subject, "*Le Monde Social des Fourmis comparé a celui de l'Homme.*" This work, judging by the reviews, if translated into English, would rival Fabre's studies of wasps and bees, in popularity. Dr. Forel kindly sent to me a copy of his paper, dealing with ants collected by the Swedish Scientific Expeditions to Australia, 1910-1913. He describes several new species of the remarkable genus *Orcetagnathus*, from Cedar Creek, Queensland, and recently (May 2), at Ringwood, I found an ant which closely resembles his figure of *O. Mjobergi*. A solitary specimen, it was lurking in moss. It has been sent to Mr. John Clark, of Perth, W.A., our leading authority on ants, for determination.—C.B.

LIFE HISTORY OF MIDGES (*CHIRONOMIDÆ*).

BY J. SEARLE.

One group of aquatic larvæ that has received very little attention from our entomologists is that of the Midges, small, dipterous insects resembling mosquitoes, another branch of the same family.

The commonest form met with by the pond-hunter is *Chironomus*, the "Bloodworm," or "Weaver," as it is commonly called. When fully grown this larva is about three-quarters of an inch in length, and of a deep-red colour—hence the popular name. This colour is due to the presence in the blood of the larva of the substance hæmoglobin, the colouring matter of our own blood. "Weaver" refers to the undulatory motion of the body when protruding from the tunnel, which the larva makes for its protection by binding together fragments of vegetation and debris in an untidy mass. This

weaving motion draws a stream of water through the tunnel, and, no doubt, aids respiration.

The larva has a pair of legs attached to the segment following the head, and another pair on the last segment of the body; these legs each bear a crown of numerous recurved hooks. The larva feeds on decaying vegetable matter. Just before pupation, the rudimentary wings and legs of the future fly may be discerned under the skin of the worm.

The pupa is furnished with tufts of respiratory hairs on its anterior end, and retains an active existence while the wonderful changes are proceeding beneath the pupa skin. When the metamorphosis is complete the pupa wriggles to the surface of the water, the pupal skin splits, and in an instant the imago flies off to meet its mate and begin another life cycle. *Chironomus* does not feed in the winged state. It is remarkable the rapidity with which the imago issues from the pupal envelope. I remember, on one occasion I was examining the contents of a bottle of "pond-life," when I noticed a *Chironomus* pupa wriggling to the surface. I called the attention of a friend, who was at my side, to the pupa, but before he could take the bottle from my hand the imago had emerged and was flying towards the window.

The eggs of *Chironomus* are laid in jelly-like masses attached to surface weeds generally. Some species lay their eggs in a spherical mass about the size of a large pea, others in sausage-shaped strings. The eggs themselves are cigar-shaped, slightly pointed at each end. Two other groups of *Chironomidae* are common in our ponds; they are the *Ceratopogon* and the *Tanytus*.

Ceratopogon is a long, footless, snake-like translucent larva; at the caudal end it has eight long setæ and a few short ones.

Tanytus are elongated, cylindrical larvæ, with a long, narrow head. It is remarkable for its retractible antennæ, which may be drawn back into sockets in the head or protruded at pleasure.

The Victorian Naturalist

Vol. XLII.—No. 2.

JUNE 10, 1925.

No. 498.

FIELD NATURALISTS' CLUB OF VICTORIA.

BUSINESS.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, 11th May, 1925. The President, Mr. J. Searle, occupied the chair, and about fifty members and friends were present.

REPORT OF EXCURSION.

A report of the excursion to Ringwood on Saturday, 2nd May, was given by the Leader, Mr. H. B. Williamson. Dr. C. S. Sutton gave some notes on the Eucalypts of the district. (See page 27.)

ELECTION OF MEMBERS.

On a ballot being taken, Miss Webb, "Arundel," Commercial Road, Prahran, and Mr. A. F. Archer, M.A., Headmaster Caulfield Grammar School, were elected unanimously as ordinary members of the Club.

Messrs. L. Hodgson and J. R. Leslie were unanimously elected as Auditors, on the motion of Messrs. A. J. Tadgell and G. Coghill.

GENERAL BUSINESS.

Office-bearers for 1925-26. Nominations were made as follows:—

President.—Mr. Geo. Coghill (proposed by Mr. H. B. Williamson and seconded by Mr. F. G. A. Barnard).

Vice-Presidents.—Mr. F. G. A. Barnard (proposed by Mr. F. Pitcher, seconded by Mr. C. Oke), Mr. A. E. Keep (Mr. Barnard and Dr. C. S. Sutton), Mr. J. A. Kershaw (Messrs. Oke and C. Lambert), Mr. E. E. Pescott, F.L.S. (Messrs. F. E. Wilson and G. Coghill), Mr. P. R. H. St. John (Messrs. F. Wisewould and F. Chapman), Mr. F. E. Wilson, F.E.S. (Messrs. J. A. Kershaw and C. Barrett).

Hon. Treasurer.—Mr. A. G. Hooke (proposed by Mr. Oke, seconded by Mr. Pitcher).

Hon. Librarian.—Dr. C. S. Sutton (proposed by Mr. Coghill, seconded by Mr. H. B. Williamson).

Hon. Editor.—Mr. C. Barrett, C.M.Z.S. (proposed by Mr. C. Daley, seconded by Mr. Kershaw).

Hon. Secretary.—Mr. C. Oke (proposed by Mr. Williamson, seconded by Mr. Barnard).

Hon. Assistant Secretary and Librarian.—Mr. H. B. Williamson, F.L.S. (proposed by Dr. Sutton, seconded by Mr. H. Hughes).

Committee.—Mr. F. Chapman, A.L.S. (proposed by Mr. Wilson, seconded by Mr. Coghill), Mr. F. Cudmore (Messrs. Kershaw and Daley), Mr. C. Daley, B.A., F.L.S. (Messrs. Kershaw and Williamson), Mr. L. Hodgson (Messrs. Coghill and Wilson), Mr. H. Hughes (Messrs. Daley and Pitcher), Mr. C. Lambert (Messrs. Pescott and Gray), Mr. F. Pitcher (Messrs. Pescott and Gray), Mr. A. Rodda (Messrs. Pescott and Gray), Mr. J. Stickland (Messrs. Pitcher and Daley).

Otway Forest Area.—Mr. F. E. Wilson moved, "That a letter of appreciation of the Government's action in preserving the Otway Forest reservation be sent to the Premier." Seconded by Dr. C. S. Sutton, and carried.

Nature Notes.—Mr. Oke made some remarks on the "Tracks of the Common Garden Snail." He expressed the opinion that the nature of the surface traversed had little or no effect upon the character of the "trail."

Mr. Oke gave an account of a Spider migration. (See article on another page.)

EXHIBITS.

By Mr. G. Coghill—Climbing Polygonum, *Polygonum baldschuanicum*; a pretty creeper, but likely to become a pest.

By Mr. C. Daley—(1) Photographs of Upper Murray district, Swampy Plains River and Gehi, taken by Messrs. F. Cudmore and E. J. Roberts; (2) waterworn pebbles from Swampy River, near the foot of Mt. Kosciuszko; (3) sketches made at Gehi, Swampy River.

By Messrs. E. E. Pescott and C. French, Jun.—Herbarium specimen of Long-tongue Greenhood, *Pterostylis grandiflora* (R.Br.), with three flowers on one stem.

By Mr. E. E. Pescott—(1) Stone axes, aboriginal, from Geelong, Vic., and Warren, N.S.W.; (2) glass spear heads, aboriginal, from Daly Waters, N.T. (one very large); (3) garden specimens of the Bird Flower, *Crotalaria laburnifolia*.

EUCALYPTS AT RINGWOOD.

Eleven species of Eucalypts were noted on the occasion of the excursion to Ringwood on Saturday, 9th May—a fair number considering the small area covered. About the station the Silver-leaf Stringybark, *E. cinerea*, var. *multiflora* prevails, this tree being a feature of the Lilydale road east of Box Hill. The Common Peppermint, *E. australiana*, was next noticed, and the Long-leaf Box, *E. clavophora*, whose most redeeming quality lies in the occasional beauty of its juvenile foliage, which sometimes closely approaches in likeness that of the Candle-bark Gum. *E. rubida*, though generally much coarser. Near the Mullum Mullum Creek some rather good specimens of the Swamp Gum were growing. This species, long regarded as *E. Gunnii*, or as *E. acerula*, Hook., was described by Baker as *E. paludosa*, but eventually considered by Maiden to be Labillardiere's *E. ovata*. It is a question, however, whether *E. acerula* is not still mixed up with it. Although we saw numerous clumps of suckers with the charming, sleek, grey leaves of the Yellow Box, *E. melliodora*, we did not meet with a tree until crossing a bend of the creek. Evidently its good qualities are recognised, for it has been almost entirely cut out hereabouts.

The Red Stringybark, *E. macrorrhyncha*, and the Messmate, *E. obliqua*, were not infrequent. The Manna Gum, *E. viminalis*, whose beauty is only skin-deep, was found on the low ground, and saplings of its twin sister, the graceful Candle-bark, were seen on the drier slopes. The Blue Peppermint, *E. dives*, was recognised. Not until the limit of our outward walk was reached, on some high ground, did we encounter the Red Box, *E. polyanthemos*, this being about the southern boundary of its range in this locality, and one of the few points where it touches, and rarely intermingles with, the Mealy Stringybark. One fine old tree was seen, and a very handsome sapling with a dense head of clean, bluish-grey foliage of roundish leaves, even more attractive than that of the Yellow Box.—C.S.S.

One is accustomed to regard the Magpie-lark (*Grallina cyanoleuca*) as a peaceful bird, but it is not always so. At Greensborough recently I saw a Noisy Minah (*Myzantha melanoccephala*) fly angrily out of some bushes at three Magpie-larks, and chase them to the Eucalypts nearby. A minute later the Grallinas were pursuing several Magpies (*Gymnorhina hypoleuca*), one of which called loudly as if in pain, on being pecked by its pursuer. The Grallinas remained in possession of the field.—A.J.T.

SOME GRAMPIANS' PLANTS.

By C. W. D'ALTON.

(Read before the Field Naturalists' Club of Victoria, 9th March, 1925.)

Plants peculiar to a certain district, or rarely found elsewhere, and those occurring in widely-separated localities are generally regarded with special interest. The Grampians flora contains an unusual number of the former class of plants, and also compares favourably with the flora of other parts of Victoria, both in number of species and the beauty of their flowers. About 917 species are to be found growing in its shady gullies, or on its rugged hill-tops. Of the plants more or less peculiar to these ranges, 16 families are represented by about 30 species, a few of these being found just over the border in the north-western district, in one or two isolated patches, and some others in more distant parts, or in other States.

Taking them in order, we find a member of the Cyperaceæ, *Tricostularia pauciflora*, or the Needle Bog-rush, growing in the swampy country near the source of the Wannon River and a few other places. Then we have three members of the Liliaceæ — *Calceolaria cyanea*, *Thysanotus dichotomus*, and *Borya nitida*. The first, the Blue Tinsel Lily, generally grows in sandy or heathy country, well out in the open, mostly in the foothills. This is extremely hard to find, except when blooming, when its satin-blue flowers, with bright yellow stamens, are most conspicuous among the dark undergrowth. It is also found, but is rare, in the south-eastern part of South Australia. The next, the Branching Fringe-lily, also a native of South and Western Australia, with a delicate, pretty flower, grows, in this State, only in the vicinity of Mt. Zero. The last I had the good fortune to find recently on Mackie's Peak, at Hall's Gap, at the northern end of the Grampians. At first it was thought to be an undescribed species, but eventually the National Herbarium pronounced it to be identical with the Western Australian *Borya nitida*, which had not been recorded previously, except from that State. Its existence here provides a puzzle for the botanists, which will be difficult to solve.

Then comes an Iris, the Blue Grass-flag, *Orthrosanthus multiflora*, also a native of South and Western Australia, and last, but not least, among the monocotyledons, we have several examples in that most fascinating of all plant groups.

the Orchidaceæ. For some reason the Grampians was for many years regarded as a poor place for orchids, and as most of the older botanists seemed to regard these rugged hills as a more suitable hunting-ground for plants of larger growth, for a long time our "known" orchids numbered slightly less than 40 only. I have, however, during the last few years, principally through the assistance of Dr. R. S. Rogers, of Adelaide, and Mr. J. W. Audas, of the National Herbarium, Melbourne, raised the number to 72. As about a dozen others have been recorded for the South-west, and may possibly be collected here in the future, our record, even now remarkably good, is likely to be still better. Some species, which for a time were recorded only from here, have since been found in other parts, so our list at present of those confined to the Grampians amounts only to two or three of the following:—*Calochilus cupreus*, or Copper-beards, *Thelymitra megalyptra*, the lilac Sun-orchid, the Veined Caladenia, *C. reticulata*, and *Caleana Sullivani*, the Spectral Duck-orchid. The first has, I believe, been reported from the south of this State, and the second from New South Wales; but the other two are entirely our own.

Caleana Sullivani was first discovered by Mr. Sullivan, 42 years ago, at Mt. Zero, only one specimen being then obtained. It was not till 10th December, 1924, that I re-discovered it on Wonderland Ranges, near Hall's Gap, and collected six specimens. It seems to like rocky hill-sides, where there is plenty of sun, and grows in the mossy crevices on the rocks in company with *Caleana minor*, which it much resembles, this likeness perhaps accounting for its not being discovered sooner. *Calochilus cupreus* is not sub-alpine, like *C. Sullivani*, but grows on the foothills, generally in tufts of short grass, where it gets protection from the ravages of sheep or rabbits. *Thelymitra megalyptra*, on the other hand, is fond of higher ground, sometimes growing on the top of almost bare rocks, and especially at Rose's Gap, a part of the Mt. Difficult Range. *Caladenia iridescent* was also first found on this range, but has since been gathered in the southern districts.

We come now to the shrubs, of which we have a very fine collection. Starting with the Proteaceæ, *Grevillea Williamsonii*, the Serra Grevillea grows, or once did grow, on a foothill of Mt. Abrupt, near Dunkeld, but as it has not been seen since Mr. H. B. Williamson collected it, in 1893, it is at present unknown to me, and perhaps may no longer exist.

there. The other, *O. oleoides*, the Olive Grevillea, a very handsome shrub, with bright scarlet blossoms and fine olive-green leaves, is found, nearly always, high on the mountain peaks, generally in crevices between the rocks. Perhaps one of the most beautiful flowers in the Grampians is *Rauera sessiliflora*, the Showy Rauera, of the Saxifragaceæ. This is met with always along the banks of watercourses, and, in some places, follows the creeks for half a mile or more, and when in full bloom, from the latter part of September till the beginning of November, its long spikes of magenta-coloured flowers, with black centres, make a very fine show. The next to be mentioned is the Orange Bell-climber, *Marianthus bygoniaceous*, bearing pretty bell-shaped flowers and belonging to the Pittosporaceæ. It is sub-alpine, and generally found in gullies or creeks; also in the Mt. Lofty Ranges and on Kangaroo Island.

We are fortunate in having no fewer than five species of Leguminosæ, all of the Genus *Pultenaea*, not hitherto found elsewhere. *P. Benthamii* is a robust plant, with fine masses of yellow blossoms; *P. costata*, a low shrub with ribbed leaves and yellow blossoms, often tinged with red, a very attractive plant when in full bloom. *P. Luehmannii* and *P. Maidenii* are more slender and less conspicuous plants, but *P. subalpina*, or *rosea*, as it was formerly called, is of a beautiful rose-pink, with soft leaves. The flowers of this are remarkable in that they turn purplish when fading, so that it is almost impossible to carry them any distance without the colour changing. It is found in only two localities, one on the top of Mt. William, and the other on the summit of Mt. Rosea, which was named in honour of this rare and beautiful plant. In the Rutaceæ we have *Phebalium dentatum*, or Umbellate Phebalium, easily distinguished from the other vegetation by its truncate leaves. It grows profusely all over these ranges, being also not unknown in the Dividing Range of New South Wales, and its pretty star-like flowers, generally pinkish in colour, make a good show. It seems curious that, out of a score or more of Eriostemon and Phebaliums occurring in this State, only about four are to be found on the Grampians. *Correa amula* is another member of the family which grows here only, in this State, but also in the Mt. Lofty and Barossa Ranges, in South Australia. What I might term our own particular family, the Rhamnaceæ, contains two species, *Trymalium D'Altonii*, discovered by my uncle, Mr. St. Bloy D'Alton, a good many years ago, and *Trymalium*

campestre, recently found by Mr. J. W. Audas and myself, on the slopes of Mt. Difficult. The first blooms in July, but the latter not till Spring.

The family Dilleniaceæ is represented by *Hibbertia humifusa*, which was first recorded from Mt. Zero, at the northern end of the Grampians, and has been erroneously entered in the Census of our Victorian plants as being in the North-west. I have since found it in several localities in the Victoria Valley, and also in the Wild Flower Garden, near Hall's Gap. In the Myrtaceæ we have five representatives. *Eucalyptus alpina* grows on most of the higher peaks, and is seldom found lower than about 2000 feet. It is a rather dwarf Gum, with exceedingly tough branches, thereby being able to withstand the strong winds occurring on high altitudes. It has fine glossy, dark-green leaves, fairly large seed-vessels much embedded on the stalks, and flowers of a rather straggling nature, the stamens being much scattered and distant. I believe this Eucalypt has been successfully grown in some of the alpine passes in Europe, where heavy wind storms are prevalent. *Melaleuca squamea* is a handsome member of the bottle-brush family, generally found in swamps and along watercourses. It has fairly large pink blossoms, with white tips to the stamens, and leaves much beset with hairlets. It ranges in two directions, from the Tasmanian mountains up the east coast of New South Wales, and by way of the S.W. of South Australia to this locality.

Calytrix Sullivanii, or Grampians Fringe-myrtle, is strong growing, and likes open, sunny situations: its cousin, the Snow Myrtle, *Lhotskya genetylloides*, on the other hand, here hides its graceful pink flowers in shady glens or between rock-walls where the sun does not penetrate too strongly. In the North-west, however, it is found in open situations, like the *Calytrix*, which is also not unknown there. Both are easily grown in gardens or parks, where they make fine ornamental shrubs. *Thryptomene Mitchelliana*, or Grampian Heath-myrtle, is also admirably adapted for cultivation, and can, if clipped, be made into a very serviceable hedge. It is also a good carrying plant, and will last in water for several weeks. This fine shrub was named in honour of that great explorer, Sir Thomas Mitchell, who discovered and named the Grampians. Another Myrtaceous plant which might be mentioned, although it occurs elsewhere in similar situations, is the handsome variety *grandiflora* of *Leptospermum lanigerum*, locally known as the "Wild Apple Bloss-

son." This has much larger flowers and leaves, grows in quite different soil, in rock crevices often high up in the mountains, and blossoms a month later than the typical form, which is also always found in swampy country.

Of the Epacridaceæ, we have two fine species in *Leucopogon thymifolius* and *Brachyloma depressum*, both sub-alpine here, the latter being about the finest of the Brachylomas, growing fairly tall and having fine sprays of creamy-white flowers, much frequented by bees for honey. It is also known from the East coast of Tasmania and the islands of Bass Strait. Labiata affords only one rather poor example in *Prostanthera debilis*, a slender plant with flowers much scattered, or generally in pairs and pale lavender in colour. Last, is that curious little member of the Stylidiaceæ, *Stylidium soboliferum*, or Bristly Trigger-plant, with its curious rosette leaves flat on the ground, and bright pink flowers on straight stalks a few inches in height. This generally grows on mossy banks in moist situations, and should make a good bordering for flower beds, provided the locality is not too dry.

Summing up, we appear to have about a score of plants confined to these ranges, and all but two or three of the others mentioned seem to have come to us from the West, and here find the limits of their range in an easterly direction.

A RECORD OF SERVICE.

The retirement of Mr. F. G. A. Barnard from the position of Hon. Editor of the *Victorian Naturalist*, an association which members of the Club had come to regard as permanent, marks the close of an epoch, but, happily, not a career of service. An epoch is a period "marked by special events," and many events of note in the Club's history have occurred during the period of Mr. Barnard's editorship. His services have been varied and always efficient; he has been generous with gifts of his "leisure" time for 32 years.

Mr. Barnard is one of the six original members of the Club who remain with us. His service in office commenced soon. After a year on the committee in 1884, he was elected Hon. Secretary of the Club, and for six years continued to hold that position; then he became Hon. Librarian. In December, 1902, on the withdrawal of Mr. A. H. S. Lucas from the office, after eight years of valued service, Mr. Barnard consented to act as editor of the *Naturalist* "for a time." That time extended to April, 1925.

For the years 1903-5 Mr. Barnard was Vice-President of the Club, and in 1905-7 occupied the Presidential chair. In 1908 he was again installed as Hon. Secretary, and acted in that capacity for two years. His editorial duties were performed as usual while he held the other offices. His zeal in the interests of the Club has been unabated for 45 years. Besides discharging official duties most efficiently, he has dealt with subsidiary affairs, constantly arising, in the same characteristic manner.



MR. F. G. A. BARNARD

Mr. Barnard has edited 7,874 pages of the *Naturalist*, as compared with 1,492 pages published during the eight years before he assumed the responsible position so recently vacated. He has introduced many improvements in the style of our journal, maintaining the high standard which gained it repute among naturalists throughout Australia and in other countries.

In addition to editing numberless contributions, many of which bristle with scientific terms, Mr. Barnard has dealt skilfully with reports of Club meetings and excursions, has reviewed books, etc., and supervised the details of publication.

A naturalist with wide interests, Mr. Barnard has contributed many pleasant and instructive accounts of his outings and longer journeys, and valuable papers on various subjects.

A paper, "Are Popular Names for Victorian Plants Desirable?" read in Sept., 1906, originated the work of the Plant Names Committee, of which Mr. Barnard was a member, and led to the subsequent publication of "A Census of the Plants of Victoria."

In a Presidential Address, during his term of office in 1906, Mr. Barnard dealt with "The First Twenty-five Years of the Field Naturalists' Club of Victoria" (*Naturalist*, Vol. 23). This paper subsequently was supplemented by one summarising the Club's history from 1905 to 1920 (*Naturalist*, Vol. 37). His Presidential Address, delivered 6th June, 1917, was entitled, "The Facilities for the Study of Natural History in Australasia" (*Naturalist*, Vol. 24). At the Club conversazione, April, 1885, Mr. Barnard gave an entertaining lecture on "Insects and their Metamorphoses." Among his many other activities may be mentioned the management of the earlier Wild Flower Exhibition, as Hon. Secretary of the Club, in the days when suburban expansion had not obliterated the floral wealth of scrub and bush, then easily reached from the city. Mr. Barnard, from his long experience in the work of the Club, has given valuable assistance to its officers, and always he has been helpful to members requiring information, assistance, or encouragement in nature study. A valuable adjunct to organisation is the "Excursion Programme" introduced by Mr. Barnard, who, as leader and adviser, has played a prominent part in Club outings. He is familiar with all the highways and byways radiating from Melbourne to mountain, plain and stream.

During Mr. Barnard's intimate connection with the Club its members have, several times, delighted to honour him. Thus, on the occasion of his marriage, and in recognition of his services as Hon. Secretary, in September, 1889 (*Nat.*, Oct., 1889), he was presented with an address, a clock, and a purse of sovereigns. In July, 1918, on completion of 25 years' editorship, he was the recipient of a pocket aneroid barometer. In February, 1923, as a foundation member, he was elected a Life Honorary Member of the Club.

Mr. Barnard has carried into other walks of life that thoroughness and zeal which signally mark his career as a

member of the Field Naturalists' Club. Succeeding to his father's old-established business in 1902, he has successfully carried it on as a registered pharmacist. In 1915 he was elected President of the Metropolitan Chemists' Association. Mr. Barnard, always keenly interested in public affairs and local advancement, has been connected at Kew with the Public Library, School Committee, Cricket Club, Horticultural Society, etc. In 1915 he secured election to the Kew Council, and was appointed to the honourable position of Mayor of the municipality, which, during his term of office, was proclaimed a city. In 1910 Mr. Barnard wrote a history of Kew, dealing with the rise and progress of the district. For many years he has been a member of the Council of the Historical Society of Victoria, and he has also submitted to the Society interesting papers on early historical matters.

Thus, quietly and unostentatiously, Mr. Barnard has brought to the performance of his various duties, public and private, soundness of knowledge and earnestness of purpose, which have ensured success in every way, and his genial and kindly nature and courteous disposition have brought him "honour, love, obedience, troops of friends." The members of the Field Naturalists' Club regret his retirement from the office of editor, so long and so faithfully held, appreciate to the full his loyalty and devotion to the Club's interests, and trust that he will be spared for many happy years.

MIGRATION OF SPIDERS.

Walking along Chancer Street, St. Kilda, in the afternoon, on 27th April, 1925, I observed that fences, garden plants and house-fronts were festooned with strands of spider-silk. Over the reserve facing the street, too, many strands were floating. Though some strands were several feet in length, the most of them were tangled into an irregular, criss-cross mesh. I caught several of these fairy "ballons," but only one had a "pilot" or "passenger"—it proved to be a mature male.

Some of the strands along the fences were examined, and spiders belonging to three different families were obtained: one a matured male; another a matured female. All these specimens may have been local spiders, that seized the threads as they came to rest, hoping to catch the owners and eat them. It is generally thought that only the young

spiders migrate, from the place of their birth, in quest of territory where they may have a fair chance of living in plenty. However, I certainly captured one mature male "ballooning"; while several others seen floating by were too large to be young ones.

Passing through Luna Park Gardens, I saw, everywhere, evidences of the migration. On pine trees and palms, and on the lawns, were innumerable strands of silk. It was the same along the Esplanade; clinging to the ramp were thousands of strands, many of them 9 feet or 10 feet in length. And hundreds of the tiny "balloons" were floating over from the direction of the Bay. I went to the beach, and found that the spiders were coming across the water, on a fairly strong breeze, blowing from a point below the You Yangs—a journey of some miles for the spiders, if this was the line they followed. But it is possible that they had been blown over the Bay, from the Tea-tree scrub at Brighton or Sandringham, and then across to St. Kilda. Even so, the journey would be three or four miles.—C. OKE.

These observations, given at the Club's May meeting, were discussed by several members.

Mr. A. L. Scott said that on, or about, 27th April, he had seen, along the fences of Elsternwick Park and of private houses, thousands of long spider-threads.

Mr. F. E. Wilson remarked that he had been surprised one day, while bathing at Chelsea, to see large numbers of spiders' "balloons" floating overhead. At the time, he felt convinced that they were coming right across the Bay, as the coast-line at Chelsea was practically straight, and certainly had no headland likely to give spiders a "send-off."

Mr. Searle stated that he had seen bushes smothered with gossamer. Migration was the usual method by which young spiders secured dispersal.

In reply, Mr. Oke said that he was convinced the migration was not confined to young spiders. The "tailed" spider, *Arachnura higginsi*, sometimes bred in colonies, a hundred or more individuals selecting the same tree, and as each spider had three or four capsules of eggs, an immense number of young ones were born among the boughs. But, the stronger and older members of the young brigade devoured many of those less advanced. Thus, though considerable numbers did "balloon," the migrations of this species were not so impressive as the one he had just described.

PLATE I.



YOUNG "MAJOR MITCHELL" COCKATOO.

[Photo. C. Barrett

A VISIT TO THE UPPER MURRAY.

BY C. DALEY, B.A., F.L.S.

(Read before the Field Naturalists' Club of Victoria,
11th May, 1925.)

With a fishing party, in March of this year, I visited Swampy Plains River. Mr. F. Cudmore, a fellow-club member, was one of our number. Our route was by the North-Eastern railway to Wodonga, where we changed to the mountainous line running eastward as far as Cudgewa, distant from Melbourne 255 miles.

To the north-east of Cudgewa lies Pine Mount, while an imposing peak to the north-west is Mount Burrowes, 4181 feet. From Cudgewa, without delay, we motored in the moonlight and through keen bracing air to Corryong, a thriving pastoral town, around which some gold-mining has been carried on intermittently, with varying fortune. Passing through intervening hills, a descent was made through the Tawong Gap between the station of the same name and the picturesque Mount Elliott run. Here we obtained a charming and most extensive view over the Murray River flats and adjacent mountain ranges.

Crossing the Murray River bridge, just below where the Swampy Plains River joins its waters with the main stream, we passed through the Bringenbrong Station, famous for its excellent cattle and well-bred horses. We were now on plains of some extent, in the basin of the Murray, and our driver preferred, in the darkness, to take a longer, and safer, course among the hills to the north-eastward. In and out we passed through the Khancoban district, emerging on the Swampy River plain; crossing creek after creek, and then the river itself, until, at last, we reached Waterfall Farm, on the Swampy Plains River. Travelling from Corryong to our destination, we had to open and close fourteen gates in passing through the estates. We crossed the river over a suspension bridge, 150 feet in length and 25 feet above the stream. As we carried our luggage across in the darkness, the swaying of the wire bridge gave a feeling of insecurity. A short ladder is fixed on each side up the steep boulders, on which the bridge is securely stayed.

Mr. Scammell's Waterfall Farm, on the high ground, is the farthest-out place on this track towards Koscíusko. The river is a stone's throw from the house, and the noise of its

waters passing through the rapids is soothing and pleasant. The Swampy rises in Mt. Koserusko, and here, at Khancoban, coming through the mountain gorge, it follows the base of a line of hills forming its southern bank. From its edge a broadening expanse of rich alluvial plains stretches northward to the hills, and westward along its course through the Khancoban and Bringeburong runs.

After a good night's rest, following a twenty-hours' journey, we were ready, in the morning, to try our fortune in the stream. The river, rapid and clear, flows over rounded pebbles and boulders, mostly granitic or schistose in character, and varying in size, but generally larger, we noticed, as we followed the river up to its source. The Swampy is remarkably free from snags, and devoid of mud, the rounded stones in its bed making it awkward sometimes for one to preserve balance in the stream. Rapids are numerous; deep pools, in which the trout love to linger, occur under the steeper banks. Vegetation along the river's banks usually is not dense enough to be an obstacle to fishing, and so sportive trout can be played with a reel and a very lengthy line. No other kind of fish seems to inhabit the river. Before breakfast, one enthusiast returned with a Rainbow Trout which weighed 4 lbs.; and the catch for the day was 27 fish, varying from 1 lb. to 4 lbs. in weight. Next day 20 was the total; then 32, a dozen of which were caught with the dry fly by Mr. Cudmore, the five largest weighing 17½ lbs.—fine specimens of the Rainbow Trout, which has been so successfully introduced into our mountain streams.

On Tuesday, with an imposing cavalcade of nine riders and two pack-horses, laden with camp equipment and provisions, we left Waterfall Farm for the Gehi, about fifteen miles distant. At first the bridle-track leads high above and along the side of the steep gorge, gradually descending to a ford. From here the country is practically virgin forest, open and park-like in aspect, with sparse undergrowth, the trees being chiefly Blue Gum, *E. globulus*, Stringybark, *E. obliqua*, Peppermint, *E. australiana*, Silvertop, *E. sieberiana*, and Gum Myrtle, *Angophora intermedia*. Patches of Wild Cherry, *Exocarpus nana* (?), and here and there Sweet Bursaria, *B. spinosa*, in flower, appeared. Along the Swampy River and its subsidiary creeks the Woolly Tea-tree, *Leptospermum lunigerum*, grew, also Manuka, *L. scoparium*, with Black and Silver Wattles, Pultenæas and Grevillias. On the plains, Red

Gum, *E. rostrata*, and Swamp Gum, *E. ovata*, were to be seen. Few introduced plants have, as yet, established themselves. The Autumn Orchid, *Eriochilus autumnalis*, was in bloom, and occasionally the Purple Loosestrife, *Lythrum salicaria*, showed a striking patch of colour among tussocks. Pasture was abundant, and it was a pleasure to ride through the forest primeval, untouched as it is by the ravages of fire or the axe.

Our party being a large one, animal life was not very evident. A fox and a kangaroo, in hasty retreat, were sighted. Rabbits, in some places, were numerous, also Opossums, and on the edges of the river plains there was evidence of the presence of Wombats. After proceeding for some miles, we came to the abrupt Gehi wall, the eastern slope of a precipitous range. Down the steep wall the bridle-track follows closely the runnel of a small stream, which the horses had to negotiate very steadily and circumspectly. As the little stream increased in volume of water through soakage from the hills, Tree-ferns, and the usual accompaniment of smaller ferns, appeared, while Blackwood, Hazel and Blanket-leaf also grew in the saturated ground, but not with the luxuriance of the gully vegetation of eastern New South Wales or Gippsland. The descent to the river-flats being made without mishap, after easier riding we again met with the mis-named Swampy, flowing with undiminished force. We crossed several times, on the way to Gehi camp, situated on the river-flat about 100 yards from the stream, with hills and mountains rising on every side. The Gehi frowns behind, and eastward up the river, Kosciusko, 7308 feet, raises its bare, grey head, weather-beaten and scored by exposure to destructive atmospheric agencies through aeons of time. Its lower slopes are wooded; but past the Snow Gum line imposing cliff-faces in succession rear themselves, devoid of vegetation to all appearance, and presenting, buttress-like, a bold front to the disintegrating elements which ever beset them.

Mt. Townshend, 7260 feet, to the north, also stands out boldly. The view of the range, looking up the Swampy River, is inspiring. The ceaseless play of sun and shadow gives frequent change in the aspect of the peaks. No snow is visible from the western side, although probably patches remain throughout the year in sheltered valley slopes on the southern aspect.

Over the elevated Kosciusko plateau there is evidence of a series of glacial epochs, of which the mount was undoubtedly

the centre, probably in the Cainozoic era; Professor David suggests that, in the very late Pliocene, or early Pleistocene times, the eastern coast of Australia, through considerable earth movement, was greatly raised in altitude, the Kosciusko area to a height of 7000 feet above sea-level; and that, a glacial age supervening, this area had an ice-cap of about 2000 feet. In the district visited along the Swampy to Kosciusko the formation of the ranges, as observed, was mostly granitic; in some places the rocks were metamorphic in character. The rock débris of the river and streams brought down from this great mountain system, is mostly of granitic or schistose origin, and of metamorphic rocks. On the river-flats of Gehi are evidences in dry, boulder-strewn water-courses, as well as in the running stream, of torrential conditions, perhaps partly very remote, when flood-gates are opened with the melting of the winter snow on the mountain slopes.

In its Alpine and forestal setting, Swampy River is a beautiful stream, quick-flowing, clear and sparkling, as it hurries down to the lordly Murray, thirty or forty miles distant. deep pools, pebbly shallows, and frequent rapids occurring in its course. It is an ideal fishing stream, partaking of the nature of the famous Scottish streams. At the back of the camp at Gehi was a range of hills, and across the river a similar range, well-wooded, the fairly extensive river flats extending eastward up the valley. On the southern bank, about half-a-mile distant, and above a deep layer of water-worn stones, evidently an ancient river deposit, was a layer of dark soil, the edge of a flood-plain with good pasturage along the river-course.

On Wednesday an early start was made under most favourable conditions as to weather, and more than ninety fish were caught, Mr. Cudmore, with the fly, being the most successful. Only about one-third of the fish hooked were retained for food, the remainder being returned to the river. Some of the largest fish were smoked and dried. It was understood that no fish under 2 lbs. was to be kept. The largest fish caught, near Scammell's, was 2 feet in length, and weighed $4\frac{1}{2}$ lbs., the heaviest was about 6 lbs. in weight. Rainbow Trout, by their agility and alertness, especially when about 3 lbs. in weight, test the skill and patience of the angler. Grasshoppers, used for bait, were numerous at Gehi, and were easily caught in the rich grass. An exceedingly heavy dew occurred each night: it was preceded by a fog, which settled down

so as to hide the mountains. In the morning it slowly lifted and became quickly dissipated before the sun's rays, the air being very clear and bracing, "each dew-laden air-draught resembling a long draught of wine." There were some very beautiful effects where spiders had woven their webs between branches, the wonderful completeness and symmetry of the design being revealed in delicate tracery by the dew on each separate thread. Bird-life was not abundant. Occasionally Black Cormorants, *Phalacrocorax carbo*, were seen near the river, but not in large numbers. The Wedge-tailed Eagle, *Urocyus urdae*, was frequently observed in graceful flight in mid-air, and a few Kookaburras, *Dacelo gigas*, awoke the echoes with their "laughter."

The party, in different sections, fished along the river for some miles. The strong current, the cold water, and the pebbly bed of the stream, made wading sometimes difficult. On the Thursday the most of our party left Cleh, crossed and re-crossed the Swampy, scaled the Wall, and returned to Seammell's, at Kluaneban. About half-way on the journey, we heard "music low and strange" ahead of us, the pleasant tinkling of bells on a caravan of horses, which, under two riders, were on their way, loaded with salt for the "licks" in distant cattle pastures near "Tom Groggan's," on the Murray.

Two of us, on return, left Waterfall Farm, driving about four miles to catch His Majesty's mail. On the way over the plains we saw four Brolgas, *Antigone australasiana*. Birds were more numerous on the open than in the forest country grasshoppers providing ample food for them. In the paddocks quail were numerous; on the swampy places plovers made shrill outcry, while the smaller birds of prey, such as Gould's Harrier, *Circus gouldi*, the Collared Sparrowhawk, *Accipiter cirrhocephalus*, and the Nankeen Kestrel, *Cerchneis cenchroides*, favoured this open country for their operations. Black Duck, *Anas superciliosa*, and Teal, *Nattinn castaneum*, could be flushed along the river here and there, and the Common Sandpiper, *Actitis hypoleucos*, was seen on the edges of the swamps. Other birds noticed during our stay were *Streperus*, the Butcher-bird, *Cracticus torquatus*, White-winged Chough, *Corcorax melanorhamphus*, Blue Wren, *Melanus cyanochlamys*, the Blue Mountain Parrot *Trichoglossus nova-hollandiae*, the Crimson, *Platyercus elegans*, and the Rosella Parrot, *P. eximius*, the Scarlet Robin,

Petroica multicolor, the Azure Kingfisher, *Alcyon azurea*, and Tits and Wrens in the forest country, with the Magpies, *G. hypoleuca*, and the Starlings on the open spaces. White Cockatoos, *Cacatua galerita*, were in flocks, and Black Cockatoos, *Calyptrorhynchus funereus*, occasionally were seen. We passed over the Khancoban plains through the station of that name, excellent cattle country. On a telegraph line were assembled about 200 Swallows, *Hirundo neoxena*, an unusual circumstance for the time of the year. Crossing the Swampy, we passed through Bringenbrong Station to the Murray. On the road were numerous tracks of snakes, this run being noted for snakes as well as for its fine cattle. The Swampy River plains have, to the north, high ranges, such as the Dargil. Past the gorge from which the Khancoban Creek comes to the 'Swampy is the rugged country of Toolong; and the plains are enclosed between these lofty ranges, on the north, and a lower range, at the base of which the Swampy flows. It is beautiful country with splendid vistas in every direction, but especially towards the east, where Kosciusko forms the dominant feature.

NOTES FROM FIELD AND STUDY

[Members are invited to contribute paragraphs for this section of the *Naturalist*, which should become a popular miscellany. Original notes, of course, are most desired; but gleanings from scientific literature, unlikely to be seen by the majority of members, will also be welcomed.]

NEW BOOK ON INSECTS.

Dr. R. J. Tillyard's forthcoming book, "Insects of Australia and New Zealand," will be welcomed by entomologists overseas as well as those in Australasia. Though mainly a text-book for students, it will be of interest and value also to the "general" naturalist. It will contain about 500 pages (royal 8vo), with eight full-page plates in colour, and more than 350 other illustrations. All the illustrations will be reproduced from new drawings or from photographs made specially for the purpose. The economic aspect of insect life will be dealt with fully. Dr. Tillyard is Chief of the

Biological Department, Cawthron Institute, Nelson, N.Z. His work, "The Biology of Dragonflies," was recognised in Europe and America as setting a fresh standard for books of its class. His new work is being published by Messrs. Angus and Robertson Ltd. Sydney. The price will be about 30/-.

A WATER-SCORPION'S WAYS.

The habits of a Water-Scorpion (*Nepa rubra*) kept in a glass jar have greatly interested me. The insect was captured in February last at Mount Martha. The pond water in the "aquarium" was frequently changed, and the tenant was fed upon blowflies (*Calliphora*), worms, small water-beetles and tadpoles. The later he caught for himself, with surprising skill. Water-Scorpions must be a veritable nightmare to other pond-dwellers! Our pet was particularly "nice" as regards personal appearance, and spent much time in combing and grooming his body with his long fore-legs. Meal-times were a long-drawn-out pleasure to him, and he would stay for hours with his sucking-beak imbedded in the body of his victim, until every particle of juice must have been extracted. *Ecdysis*. During three months of captivity the *Nepa* changed his coat twice. It was rather surprising to see, one morning, a "scorpion" almost double the size of the one we had been observing the night before, while the discarded "coat," looking exactly like its recent wearer, lay at the bottom of the jar. It was possibly a third "moult" that caused the insect's death on 25th May. I would be interested to hear from a student of pond-life who has noted more than two "moult" in *Nepa*.—E.C.

A DRAGONFLY THAT POSES.

In our garden at Mont Albert grows an English Broom (*Sarothamnus scoparius*), perched on a bank above the lawn. This, of late, has been the centre of some instructive entertainment on account of the curious habit of small dragon flies that have been resorting to it, one might think, for the purpose of "making believe." In late summer the air at times is full of small flies, and on these the Dragonfly, *Lestes loda*, Selys, apparently delights to feed. Coincidence or otherwise (we leave that to the argumentative), there are some dry valves of Broom pods extending at a wide angle from the stiff branches of the bush. *Lestes* flits to the Broom-tips and extends its body, with wings depressed, almost at right angles to the stem, and it is difficult, at a

short distance, to distinguish pods from dragonflies. The insects at brief intervals dart into the space around, and almost imperceptibly return with something in their jaws. The victims are tiny flies, which, in a few seconds, are sucked dry, when their remains fall to the ground; it reminds one of a parrot biting nuts and dropping the broken shells.—F. CHAPMAN.

VICTORIAN PLANTS IN SCOTLAND.

An item of interest to Victorian field naturalists is recorded in the 1924 Transactions of the Proceedings of the Botanical Society of Edinburgh. At the March meeting, among the plants in flower exhibited by the Royal Botanic Gardens were the Scarlet Coral Pea, *Kennedyia prostrata* (R.Br.), Hairy Pink-eye, *Tetratheca pilosa* (Labill), while the West Australian *Kennedyia nigricans* also was shown. Our Club is doing useful work in educating the public in regard to native flowers for the garden. It is not long since a Melbourne nurseryman, when urged to show more native plants in his window, replied: "I can always sell exotics, but when I name the Victorians as useful and beautiful, I have often met with a rebuff." The "Natives" are more popular now.—A.J.T.

A BOTANICAL "FIND."

Borya nitida, a little tufted plant with insignificant inflorescence, only a few inches high, belongs to the Johnsoniæ tribe of the dry-fruited series of our lilies. In the same section are *Stawellia*, of one species only, two *Johnsonias*, and two *Amocrinums*, all confined to Western Australia; and the *Bartlingias*, six of which are also restricted to the western State, a seventh extending thence to New South Wales and Tasmania, and the eighth recorded only from this State, New South Wales and Queensland. The discovery by Mr. C. W. D'Alton of *Borya nitida* at Mackie's Peak, near Hall's Gap, in the Grampians, is, perhaps, one of the most interesting of our botanical "finds" in recent years. It is a far cry to Cape Arid, on the other side of the Great Australian Bight, the nearest point recorded for the plant in Western Australia—about 1200 miles in a bee line—and it is still further to Rockingham Bay, in Queensland—nearly 1700 miles—where the only other species in the genus is located. Bentham, finding only slight structural differences between this *B. septentrionalis* and its

western ally was, perhaps, constrained to state that it is "most distinctly separated by geographical position." It would thus appear that the Borya is really monotypic, and affords another very striking instance of the discontinuous distribution of certain of our plants, which is so closely connected with, and only explicable by the reading of, the physiographical history of the continent.—C.S.S.

"MAJOR MITCHELL" COCKATOOS.

None of the Cockatoos is more beautiful than the "Major Mitchell," *Cacatua leadbeateri*, and none more engaging, in the wilds or captivity. Pink Cockatoo is the vernacular name favoured for this species by the Check-list Committee of the Royal Australasian Ornithologists' Union. In many districts it is called "Wee Juggler" but to the majority of bird lovers and bush-folk it will always be the "Major Mitchell." Its popularity, as a handsome "talking" bird, has been its greatest misfortune. It is rare now in some parts, where formerly many broods were reared every season. From other localities it has disappeared, owing mainly to the advance of settlement. Trappers and nest-robbers are responsible for the decrease of *C. leadbeateri* in certain of its Victorian haunts that still remain wild. I have met with it, in pairs, in the Mallee country, and know that it nests in the Whyperfield National Park. Before that area became sanctuary for native fauna, the homes of cockatoos and parrots were raided freely by trappers and other persons. The young bird shown in the photograph (see plate) was one of three born in a Gum-tree hollow, up Whyperfield way. It was posed for the portrait, and displayed its resentment just as the camera shutter was released.—C.B;

MOSQUITOES OF AUSTRALIA.

The mosquito fauna of Australia and the adjacent islands, including Tasmania, is represented by about 100 known valid species, some of which extend into New Zealand, New Guinea and the Oriental region. Of these species, only six are included in the *Anopheles* group. The actual number of indigenous species is probably considerably larger, since only a comparatively small area of the continent has been systematically searched for these insects. Our knowledge of the early stages and breeding habits of even the commoner species is very incomplete, and much useful research in this direction remains to be done. Of the seventeen species known from

Victoria, only one is restricted in its range to this State, and, although common, nothing is known of its life-history. Two of the most abundant species, i.e., *Aedes camptorhynchus* (Thoms.) and *Aedes albounulatus* (Macq.) which are found also in the adjoining States, rival some of the northern species as pests in swamp and bush localities, while another, *Anopheles unimulipes* (Walk.), with a still wider Australian distribution, is of importance as a possible, if not an actual, carrier of malaria in the northern States. Of the purely domestic species, the ubiquitous *Culex fatigans* (W.) is probably the best-known and most troublesome indoors. As it rarely breeds elsewhere than in contaminated, stagnant water near habitations, its scarcity, or abundance, is a fairly accurate index to the sanitary condition of the vicinity.—G.F.H.

BIRDS OF A SUBURBAN GARDEN.

A few gum trees will attract native birds around the suburban home. Where I live, at East Malvern, many of the original Eucalypts are standing, and, as a result, we are never without a bevy of indigenous birds, to say nothing of the introduced species. In my neighbour's yard a pair of Black-and-white Fantails, *Rhipidura leucophrys*, last season reared a brood of two. The young birds have gone elsewhere, but the parents we still have with us. Every evening four sedate Kookaburras, *Dacelo gigas*, perch in my Wattle trees for a while before going to roost, and are delighted when I provide them with a meal—scraps of meat. So tame is one that I have no difficulty in approaching within two or three yards of it. A pair of Shrike-tits, *Falco vultus frontatus*, we have had as tenants for several months. They spend most of their time "prospecting" the crevices in the bark of the gums for lurking insects. Of White-plumed Honeyeaters we have quite a flock, and several young birds were reared in the street last season. Nothing pleases them more than to pester the Kookaburras; they are always assisted by the Fantails and a pair of Blackbirds. The Fantails, however, are the most courageous; frequently they alight on either the head or the back of a Kookaburra, and remain for perhaps a minute. When a black cat one day was walking along the top of a paling fence, the Fantails alighted upon its back, and enjoyed a ride for ten yards, scolding their victim vigorously the while. The cat stopped several times, and arched its back, but its footing was so precarious that it could not dislodge the birds. In the

early morning, a pair of Magpies, *Gymnorhina hypoleuca*, and two or three Magpie-larks, *Grallina cyanoleuca*, are seen hunting for food in our back garden. Recently (April and May) the autumn notes of the Grey Butcher-bird, *Craicticus torquatus*, have been heard. A pair of welcome Swallows, *Hirundo neoxena*, spend most of their resting-time sunning themselves on the house telephone wires. A small family of Blue Wrens, *Malurus cyaneus*, resides in the street, and on rare occasions visits our garden. Often at night we hear the monotonous call of the Boobook Owl, *Ninox boobook*. When the Eucalypts were blooming, about Christmas-time, the harsh call of Red Wattle Birds, *Anthochaera carunculata*, were heard all day long, and frequent squabbles between these birds and the White Plumed Honeyeaters, *Meliphaga penicillata*, took place. The Bronze Cuckoo, *Chalcites busckii*, and the Fantailed Cuckoo, *Cuculantis flabelliformis*, have each paid us one visit only. A flock of nine Rosellas, *Platycercus eximius*, flew over one morning, and on another occasion a pair of Galahs, *Cacatua roseicapilla*; the latter birds, probably, had escaped from a local aviary.—F. E. W.

BIRDS AND BUTTERFLIES.

It is not unusual to see insectivorous birds capturing moths, indeed, certain species prey upon them freely, especially in the nesting season. But what proof have we that birds are more than "casual" enemies of butterflies, that they have been concerned in the matter of mimicry?

Some opponents of the theory that distasteful butterflies are mimicked by other species lacking that form of protection, contend that birds have no special liking for diurnal Lepidoptera. Further, they declare that, when butterflies are hunted by birds, no choice, apparently, is exercised; "pleasant" and "distasteful" forms alike are taken indiscriminately. The subject has been a debatable one for years, and every bit of evidence is worth recording.

Dr. H. Eltringham, in his book, "Butterfly Lore," gives an excellent summary of facts and theories in respect of this subject. "The degree to which a butterfly may be destroyed and eaten by its enemies," he writes, "depends on the state of the destroyer's appetite for the time being. A very hungry bird will eat certain kinds of butterflies which, less

ravenous, it will promptly refuse." "All manner of factors," Eltringham adds, "will affect the result."

When butterflies are unusually abundant in their haunts, some birds will certainly take heavy toll of them; while in a normal season few may be taken. Last summer, butterflies of several species were so plentiful around Melbourne and the nearer hill country that one might see thousands almost at a glance in the most favoured localities. It was so at Eltham, in December and January, and some birds, at least, were butterfly hunters every day. Early in January, Mr. W. C. Tonge observed a pair of Leaden Flycatchers, *Myiagra rubecula*, feeding their young in the nest chiefly upon Common Brown Butterflies *Heteronympha merope*, "jamming them into the little beaks, wings and all." The diet was varied with a few dragonflies. Doubtless, many broods in Eltham and other districts were reared largely upon butterflies last season.

Respecting the Wanderers, *Danaida archippus*, Anderson and Spry state: "They feed quite openly, having no fear of birds on account of a noxious smell they emit." ("Victorian Butterflies," p. 43.) The species of the sub-family, Danainæ, are all "protected" like the Wanderer, and they have many mimics, it is claimed, among "unprotected" species of other sub-families. In Australia, and also in Egypt, I have seen large numbers of Danaine butterflies where birds also were plentiful, but I have no record of one of these "distasteful" insects being attacked by birds.

Danaine butterflies are slow in flight, and birds could capture them easily. Their immunity from attack, then, apparently, is due to their distastefulness.—C.B.

When walking through the bush at Eltham on 5th October, 1924, I noticed a female Rosella Parrot, *Platycercus eximius*, fly up from a rotting tree-stump. A hollow had been cleaned out on the ground within the stump, and on the 8th the bird was there, sitting on three fresh eggs. Rain had fallen recently, and the Parrot's nursery was damp. On the 10th it was wet and deserted, more heavy rain having fallen in the interim. A few years ago, in a neighbouring paddock, five or six young Rosellas, fully fledged, were found in a rabbit burrow.—W. C. TONGE.

The Victorian Naturalist

VOL. XLII.—No. 3.

JULY 10, 1925.

No. 499.

FIELD NATURALISTS' CLUB OF VICTORIA.

The annual meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, June 15, 1925. The President, Mr. J. Searle, occupied the chair, and 105 members and friends were present.

CORRESPONDENCE.

From Hon. Secretary Victorian Horticultural Society, inviting members of the Club to a lecture, entitled "Our Eucalypts," by Mr. W. Russell Grimwade, to be given in the Horticultural Hall on June 18.

REPORTS.

1. A report of the excursion to the Biology School, University, on Saturday, May 30, was given by the leader, Miss J. W. Raff, M.Sc., who said that 25 members had met in the Zoology Laboratory. The subject dealt with was "Useful Zoology," and attention was confined to those forms of Invertebrata that are of use to man, both directly and indirectly. Various specimens and preparations illustrating these were exhibited, and members examined them with interest.

2. A report of the excursion to Mt. Evelyn, on King's Birthday, was given by the leader, Mr. C. Oke, who said that a party of 18 members had spent a very pleasant day in the hills.

ELECTION.

On a ballot being taken, the following were duly declared to be unanimously elected as ordinary members of the Club:—Mrs. F. Pitcher, "Frechencourt," Punt Hill, South Yarra; Mr. G. F. Hill, National Museum; Mr. W. E. Jones, 28 Clyde Street, South Yarra; Mr. A. S. Robertson, 22 Mayfield Avenue, Malvern.

GENERAL.

The Hon. Secretary read the 45th Annual Report. Mr. C. A. Lambert moved that the report be received and adopted. Seconded by Mr. F. Pitcher, and carried.

The Hon. Treasurer read the 45th Annual Statement of Receipts and Expenditure, and drew attention to the following points of interest:—

Subscriptions differ by only 5/- from those of the previous year. Proceeds from sales of *Victorian Naturalist* have increased from £2/7/9 last year, to £21 this year, owing to the zealous efforts of the Hon. Librarian. Wild Flower Show profits, £118, as compared with £107 last year. Various economies have brought about a reduction of £91 for the year in the cost of the *Naturalist*, and of £12 in general printing.

The Statement was received and adopted, on the motion of Messrs. G. Coghill and L. Hodgson.

Mr. Hooke moved a vote of thanks to the Auditors. Seconded by Mr. H. B. Williamson, and carried.

ELECTION OF OFFICERS AND COMMITTEE.

There was only one nomination for the office of President, and Mr. Geo. Coghill was declared duly elected. Mr. A. E. Keep asked that his name be removed from the list of those nominated as Vice-Presidents. The ballot resulted in the election of Messrs. F. G. A. Barnard and E. E. Prescott, F.L.S. The following (unopposed) were declared duly elected:—Hon. Treasurer, Mr. A. G. Hooke; Hon. Librarian, Dr. C. S. Sutton; Hon. Editor, Mr. C. Barrett, C.M.Z.S.; Hon. Secretary, Mr. C. Oke; Hon. Assistant Secretary and Librarian, Mr. H. B. Williamson, F.L.S. Messrs. Hughes, Lambert and Pitcher requested that their names be withdrawn from the list of members nominated for the Committee. The ballot was then taken, and the following were elected:—Messrs. F. Chapman, A.L.S., C. Daley, B.A., F.L.S., J. A. Kershaw, P. R. H. St. John and F. E. Wilson, F.E.S.

Mr. A. J. Tadgell moved that a hearty vote of thanks be accorded to the officers and committee for their labours during the past twelve months. Seconded by Mr. A. L. Scott, and carried.

BOTANIC GARDENS.—Mr. F. G. A. Barnard moved "That this Club views with alarm the proposal to alienate portion of the Botanic Gardens for the purpose of a tramway, and desires the Committee to forward a strong protest to the Minister for Lands, and the Town Planning Commission. Seconded by Mr. Oke, supported by Messrs. Pitcher and Searle, and carried."

SPECIAL MINUTE.—The following minute was read, and adopted with acclamation:—"That the Committee and members of the Field Naturalists' Club of Victoria desire to place on record in the minutes of the Club their hearty appreciation of the continued and efficient services of their fellow-member, Mr. F. G. A. Barnard, in various offices of the Club during 45 years of loyal and active membership, and especially in connection with the Editorship of *The Victorian Naturalist*, in which responsible office Mr. Barnard has unselfishly given 32 years of capable and distinguished service. The general wish is expressed that Mr. Barnard may be long spared to continue his interest and career of usefulness in the Club's work."

ADDRESS—An address on "The Life and Work of Baron von Müeller" was given by Sir Baldwin Spencer, to mark the centenary of the birth of the Baron. Mr. G. Coghill proposed a vote of thanks to Sir Baldwin for his most interesting address. Seconded by Mr. H. B. Williamson, and carried with acclamation.

Mrs. E. Coleman and Messrs. F. Pitcher, A. D. Hardy, J. Searle and H. B. Williamson spoke briefly of Baron von Müeller and his work.

ANNUAL REPORT.

The Hon. Secretary, Mr. C. Oke, read the forty-fifth Annual Report, 1924-25, as follows:—

"To the Members of the Field Naturalists' Club of Victoria.

"Ladies and Gentlemen—

"In presenting the forty-fifth report, for the year ended April 30, 1925, the Committee desires to thank members for the hearty support received from them during the period; and to congratulate them on the continued success of the Club. During the year 20 ordinary, 2 country and 2 associate members have been elected, while the resignations number 14, and 4 deaths have occurred, leaving a total membership of 244.

"With deep regret, we have to record the deaths of four members. Mr. J. B. Walker, who died in June from injuries he received in a street accident; at one time regularly attended our meetings, but of late years very seldom appeared. As our printer, for many years, he displayed great interest in the *Naturalist*, and spared himself no

trouble to give us a first-class journal. The death of one of our associate members, Master S. J. Walker, who was developing a love for natural history, also occurred in June. In October, Mr. L. B. Thorn, a member of the Committee, died after a very short illness. Mr. Thorn was well known to members as a collector and a student of butterflies and moths. He was an enthusiastic worker for the Club's good, whose loss we much regret. Also, in October, the Club lost one of its oldest members in Mr. G. R. Hill, who was elected in 1884, and had acted as a member of the Committee for two years.

"The monthly meetings have been held regularly, and have been well attended, as usual, the average attendance being 50-60 members and friends. Thirteen papers have been read and three lectures delivered, all both interesting and instructive. They were contributed by the following members:—Dr. W. MacGillivray, Messrs. J. C. Goudie, P. F. Morris, L. B. Thorn, C. Daley (Presidential address and papers), A. J. Tadgell, F. Pitcher, J. Stickland, J. H. Harvey, A. L. Scott, E. E. Pescott and C. French, Jun., and C. W. D'Alton. The most of the papers have been published in the *Naturalist*. It is a pity that more discussion does not follow the reading of some of our papers, as nothing could add more to the general interest of a paper than to hear it discussed by members having, perhaps, divergent views on the subject.

"The excursions are as popular as ever, and most of them have been very well attended. A number of short Saturday afternoon trips have been made to places around the metropolis, and whole-day trips to Hurstbridge, Beaconsfield, Wandin, Brisbane Ranges, Mornington, Ferntree Gully, and Clematis; more extended trips were those to Bendigo and Wilson's Promontory.

"The annual Exhibition of Wild Flowers was held in the Melbourne Town Hall on Tuesday, October 21, and was opened by Sir James Barrett. Although it was rather late in the season, a very fine display of flowers was staged by a number of capable workers, to whose energy the success of the show was due. The Committee desires especially to thank all who helped on that occasion. The financial result of the show was a profit of £118, and of this amount £55 was given to the Victorian Bush Nursing Association. In returning thanks for the donation, the Association invited the Club to

nominate two members as Life Governors of the Association, and the Committee has recommended Mrs. E. Coleman and Miss A. Fuller.

"It is always a pleasure to see our members' names in the University Graduates' List, and this year we have to congratulate Mr. P. C. Morrison on taking the degree of Master of Science.

"The forty-first volume of *The Victorian Naturalist* has been completed, and once again the Club is greatly indebted to Mr. F. G. A. Barnard for the capable way in which he has edited our journal. To the regret of everyone, Mr. Barnard tendered his resignation as Hon. Editor, in February, as from the end of Vol. XLI. Although very loth' to accept the resignation, the Committee recognised that, as Mr. Barnard had done more than his share for the Club, it was only right that he should be relieved of the editorial work, after 32 years' service. At the March ordinary meeting Mr. C. Barrett was nominated as Editor. No other nomination was received, and Mr. Barrett was declared unanimously elected.

"The Committee had under consideration the high cost of printing the *Naturalist*, and as the printers could not reduce their charges, it was decided to obtain quotations from several other firms. As a result, in September the printing of our journal was transferred to The Ramsay Publishing Pty. Ltd. The cost of producing the *Naturalist* now is lower than hitherto.

"Your Committee has given its co-operation to several measures for the preservation of our fauna and flora in various localities throughout the State.

"The Hon. Treasurer reports that the receipts for the year amounted to £399, and the expenses to £337, leaving a credit balance of £62.

"The Hon. Librarian reports that he has thoroughly overhauled the Library, rearranged it, and brought the card catalogue up to date. Efforts to fill the numerous gaps in our files have met with such success that, with very few exceptions, the sets of publications being received by us are now complete. In all, 201 missing volumes and parts have been obtained. Only 27 of these were purchased, at a cost of £6/5/-. The remainder have been donated; and the very best thanks of the Club are due to the various Societies concerned for their generosity. The sum of £10/15/6 was spent in bookbinding, but a much greater amount must be devoted to

this purpose, before even the more important literature on our shelves is bound in volumes.

"The Committee desires to express its thanks to Messrs. Coghill and Haughton for the use of rooms for Committee meetings. The attendance at the fourteen Committee meetings held during the year has been as follows:—Messrs. Searle and Oke, Dr. Sutton, 14; Mr. Williamson, 13; Mr. Stickland, 12; Messrs. Barnard, Rodda and Wilson, 10; Messrs. Cudmore and Daley, 9; Messrs. Coghill, Hooke, and St. John (elected in November), 7; Messrs. Kershaw (away through illness) and Thorn (died in October), 4; Mr. Barrett (elected in March), 3.

"In conclusion, your Committee desires to express its gratification at the way in which its efforts on behalf of the Club have been supported by the members, and trusts that the same support will be given to the incoming Committee.

"On behalf of the Committee,

"(Signed) J. SEARLE, President.

"C. OKE, Hon. Sec."

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—Works by Baron von Müller, and six species of Australian plants described by him during the years 1853-5: *Grevillea confertifolia*, *G. victoria*, *G. pterosperma*, *G. Miqueliuna*, *Hakea rostrata*, and *Banksia ornata*.

By Mr. F. G. A. Barnard—Pamphlet: Reprint from *Extra Essays on Australian Vegetation*, 1866, presentation copy to Sir George Stephen; lecture delivered at the Public Library, 1871, on *Forestry*, by Dr. Von Mueller; and personal letter from him.

By Mr. Geo. Coghill—Letters from Baron von Müller, 1884-5; also plants from Phillip Island identified by the Baron, in his own handwriting, 1886.

By Mrs. E. Coleman—(1) Collection of ferns made by Baron von Müller, in the possession of Miss D. Kidd, St. Kilda; (2) *Pterostylis vittata*, from Black Rock, 15/6/25; (3) *Corysanthes bicalcarata*, from Healesville, 15/6/25; (4) Water-scorpion, with two discarded skins.

By Mr. F. Chapman, A.L.S.—*Hakea laurina*, grown at Balwyn, on silurian mudstone; tree about eight years old.

By Mr. C. Daly, B.A., F.L.S.—Two portraits of Baron von Müller, and works by the Baron, from the National Herbarium Library.

By Mr. E. E. Pescott, F.L.S.—Portrait of Baron von Müller, 1865; photograph of Maurice Heuzenroder's shop, in Adelaide, in which the Baron worked; letter from Becker, the explorer, written to von Müller, 9/3/60; von Müller's list, in his own writing, of his last exhibits at the Field Naturalists' Club, September, 1896; letters (1896) from the Baron to Mr. C. French, Jun.; and other items.

By Mr. J. A. Kershaw—Ringed snake (*Farina occipitalis*), swallowing Blind Snake; from Pachewilloek, Victoria.

By Mr. E. McLennon—Private interleaved copies of the last and second last editions of Baron von Müller's *Select Extra Tropical Plants*, with annotations and emendations. The last set of annotations has not been published.

By Mr. V. Miller—Double "Coco-nut" or Coco-di-na. *Lodiocera seychellensis*; also cut and uncut stones from the Barcoo River, Central Queensland.

By Mr. A. E. Rolda—Bean pods and segments of Pandanus fruit, from North Queensland.

By Mr. J. Searle—Photograph of Dr. von Müller as a young man.

FIELD NATURALISTS' CLUB OF VICTORIA.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR TWELVE MONTHS ENDING 30th APRIL, 1925.

Receipts.

To Balance in London Bank on 1st May, 1924	£5	16	7
„ Subscriptions—			
Town Members:			
Current year	£105	0	0
Arrears	17	12	6
In advance	4	12	6
Country Members:			
Current year	17	15	0
Arrears	5	0	0
In advance	2	12	6
Associate Members	0	12	6
	£153	5	0
„ "Victorian Naturalist"—			
Subscriptions	8	17	6
Cash Sales	21	0	10
Advertisements	4	0	0
Reprints Charged	3	2	10
	37	1	2
„ Donations to Publishing Fund	7	8	0
„ Interest from Savings Bank and War Loan			
Bond	11	9	4

To Sale of Club Badges	0	5	0		
„ Char-a-banc Excursion	4	3	0		
„ Plant Census Account—					
Sale of books in year	16	8	4		
„ Wild Flower Exhibition, October, 1924—					
Ticket Sales	£27	8	0		
Cash at doors	83	1	0		
Sale of Plants, Flowers and Refreshments	59	3	2		
				169	12 2
					399 £2 0
					£405 8 7

Expenditure.

By "Victorian Naturalist"—

Printing	£154	5	2		
Illustrating	17	8	7		
Wrapping, Despatching and Postage	20	1	6		
Reprints—free	7	10	0		
Reprints—charged	1	3	0		
				£200	8 3
„ General Printing				11	14 6
„ Library Account—					
Periodicals and Books Purchased				5	1 6
„ Rent of Hall, and Fee to Caretaker				13	10 0
„ Postage, Advertising, Bank Charges, Insurance, and Sundries				10	4 1
„ Char-a-banc Excursion				5	10 0
„ Plant Census Account				3	7 6
„ Wild Flower Exhibition, October, 1924—					
Charges at Melbourne Town Hall	£6	3	6		
(Hire of Hall, paid in previous year, £18)					
Purchase of Plants and Flowers	13	5	0		
Printing and Advertising	8	7	6		
Cartage, Freight and Sundries	5	2	4		
Donation to Bush Nursing Association	55	0	0		
(Balance retained in Funds of Club, £63/13/10)					
				87	18 4
„ Amount withdrawn to increase Savings Bank Deposit to £150	38	10	8		
Add Interest accrued	11	9	4		
				50	0 0
					£387 14 2
„ Balance in London Bank on April 30, 1925					17 14 5
					£405 8 7

STATEMENT OF ASSETS AND LIABILITIES ON 30th APRIL, 1925.

Assets.

Arrears of Subscriptions, £70/10/6, estimated to realise, say	£50	0	0
War Loan Bond	20	0	0
London Bank Balance	17	14	5
State Savings Bank	150	0	0
Library and Furniture (Insurance Value)	130	0	0
Plant Census Account (difference between cost and sales of books)	168	4	8
Accounts owing to Club—			
For Advertisements in "Victorian Naturalist" £4 10 0			
For reprints charged 3 19 9			
		8	9 9
		£544	8 10

Liabilities.

Subscriptions paid in advance	£7	5	0
Balance of Char-a-banc Fund	5	6	0
Outstanding accounts—Nil.			
	£12	11	0

Examined and found correct on 1st June, 1925.

L. L. HODGSON	}	Hon. Auditors.
J. R. LESLIE		

A. G. HOOKE,
Hon. Treasurer.

NATIONAL MUSEUM NOTES.

SNAKE SWALLOWING SNAKE.—A Ringed Snake, *Furina occipitalis*, recently forwarded to the National Museum by Mr. G. Patullo, was taken in the act of swallowing a Blind Snake, *Typhlops*. When found, the head and part of the Blind Snake was in the mouth of the Ringed Snake, but was disgorged. After capture the *Furina* again commenced to swallow its prey, and had already ingested the head and fore part of the body when it was killed. Both the *Furina* and *Typhlops* were of medium size. They were taken at Pachewillock, Victoria, in February last.—J. A. KERSHAW, Curator.

CORRECTION.—*Naturalist*, May, 1925, p. 32, fourth line from bottom, "December, 1902," should read December, 1892.

THE ANTS OF VICTORIA.

BY J. CLARK, F.L.S.

[Part I.]

Probably the most interesting, and neglected, group of insects is the large family of ants, *Formicidae*. This great continent is very rich in large and peculiar species, which are not found elsewhere, yet little or nothing is known concerning them. The habits and life history of even our commonest forms are unknown. This is the more unfortunate because, with the advance of settlement, the natural bush, gradually, is becoming cultivated land, and the ants, like many other native animals, slowly, but surely, are disappearing. Before it is too late, it would be well to learn all we can of these insects; even now, some species, which are very local, have become extremely rare.

The difficulty attached to the study of Australian ants has always been the lack of popular literature on the subject, unfortunately, such literature does not exist. Most of our ants have been described in various scientific journals, published in German, French and Italian. To the average nature lover, these records are uninteresting, since they are technical descriptions of the ants. They are, of course, essential, from a scientific point of view, but make little appeal to one bent on the study of ants in the bush.

Books published in Australia contain very little concerning ants. The best of them is *Australian Insects*, by W. W. Froggatt, published in 1907. In 1905, the same zealous entomologist published a catalogue, with notes on a few species, of the Australian ants. Mr. H. Tryon, in 1888, published some notes on Queensland ants, in the *Proceedings of the Royal Society of Queensland*. To the *Victorian Naturalist*, in 1903, E. E. Barker contributed a good paper on Bull-dog Ants; F. P. Dodd contributed interesting notes to the same journal, in 1902. The most useful book on ants in general is that by Professor W. M. Wheeler, entitled *Ants: Their Structure, Development and Behaviour*. It is published by the Columbia University Press, New York, U.S.A.

Some quaint and weird stories, particularly in connection with our Bull-ants, will be found in literature published overseas. Sharp (1899) writes that the nests are "said to be sometimes five feet high." This surely must apply to Termites' nests. Bull-ants will climb anywhere; and it is possible that a stranger, seeing huge ants on a high mound, might conclude that they were the owners. Probably the quaintest story regarding our Bull-ants, is that recorded by Smith, in the Proceedings of the Linnean Society of London (1861), from details supplied to him by Mrs. Hatton, of Sydney. The "funeral rites" of the soldier-ants are described. This has been dealt with in the *Victorian Naturalist*, by Barker.

I have kept Bull-ants in captivity for some years, and find that, far from showing sympathy with the injured, or the dead, they throw them on the rubbish-heap, where gradually they become covered in the refuse from the nest. In the bush, other ants would certainly carry such bodies to their nests, and it is possible that Mrs. Hatton noticed some species of *Camponotus*, several of which look much like Bull-ants to the casual observer, carry the dead Bull-ants to their nests, which frequently are indicated only by holes on the surface of the ground. When food is being taken to the nest in abundance there are generally a few ants around the entrance; this may have suggested the "funeral."

In an article in *The Entomologist* (1865), B. T. Lowne dealt with a number of ants seen and captured during a two-months' visit to Sydney, in 1862. Some of his notes are good; but in several cases his observations do not tally with those of Australian observers. In dealing with *Myrmecia gulosa*, one of the commonest Bull-ants, he says:—"These ants are the most rapacious and numerous of Australian species; they climb trees in vast numbers, to attack the great *Anoplognathi*, which they pull down and bury alive in the earth; although, in point of bulk, the beetles bear very much the same relation to the ants that an elephant does to a man. I have, however, often seen three ants bring one of the largest to the ground in spite of all its exertions. Their sting is very severe, but the pain occasioned is evanescent." In dealing with *Myrmecia nigrocincta*, he says—"This insect is remarkable for the leaps it takes in running, often jumping over a foot of ground at a leap; it also jumps from the trunks of trees upon persons walking near it. Its sting is very severe."

Bull-ants do climb trees, and they will attack anything and everything that comes in their way, but why they should pull down and bury the beetles alive is a mystery that Lowne does not explain. There is no reason whatever for such action. From my own observations, these ants carry home every insect they capture; but the victims, as a rule, are honey-bees, and other soft-bodied insects, taken to feed the larvæ in the nest. I have never known adult Bull-ants to eat animal food; they always prefer the nectar of blossoms and the exudation of trees, shrubs, etc. In my artificial nests the food supplied is honey, sugar in various forms, and cake of all sorts, with plenty of water each day; also a quantity of insects and caterpillars for the larvæ. Although the adult Bull-ant is really a honey-eater, the larvæ must have an insect diet, or they will eat one another when close together. On more than one occasion, when the food supply was overlooked, I found that one larva had apparently been supplied as food to other two by the ants; and several times weak, or injured, ants have been served to the larvæ. When the larvæ have finished their feeding on the insect body, its remains are carried outside the nest to the rubbish-heap, where, in the bush, they are promptly removed by other ants. Thus, a Bull-ants' nest very rarely shows signs of food remains, either inside or out.

Lowne's observation, that these ants jump from trees on to a person, is quite correct, as most bush lovers know; but the statement that the Jumper, *nigrocincta*, can jump over a foot of ground requires verification. I have not seen one jump more than four inches, and that is more than twice the usual length of the Jumper's "leap."

Apart from the Bull-ants, there are many species that will reward study, such as the Harvesting Ants, which collect, and store in their nests as food, seed of various plants including grasses. Very little is known concerning "Harvesters" in Australia. In other parts of the world, there are Fungus-growing Ants. These insects strip the leaves off trees to make the beds on which they raise the fungus. So far, this habit has not been discovered in any Australian species.

The nests of most ants contain numbers of other insects, mostly beetles. Although numbers of these insects have been collected in Australia, we possess only meagre knowledge concerning them, or the reasons for their presence in the nests

with the ants. Myrmecophiles, and their habits, offer a wide field to the entomologist.

The study of ants is most interesting, and entails very little exertion. It should appeal to those whose health does not allow of vigorous work in the bush. It keeps the observer in the open, with his mind fully occupied, so that life's worries are soon forgotten, while a store of valuable information is gained. Ants are numerous everywhere. They are easily kept in artificial nests, and make interesting pets. The food required by them is always at hand, and the nests are readily made; so that no one should experience much difficulty in keeping ants for observation at home.

At present a bare list of the ants found in Victoria would not be very useful, so I propose to give a detailed list of the various forms, with references to the literature, and notes where possible. The literature is very scattered; besides, much of it is now unobtainable and deals only with the descriptions of the species. Inclusion of references to the literature is the more necessary from the fact that Froggatt's catalogue gives only some 30 species as found in Victoria, whereas, thanks to my many entomological friends, I have been able to see several times that number from this State. Of course, it must be borne in mind, that a number of the early workers considered "Australia" as sufficient indication of locality, so that many in Froggatt's list should be treated as Victorian species.

The compilation of this paper has been rendered possible through the assistance I have received from entomologists in Victoria, particularly from Mr. J. A. Kershaw, through whose courtesy I have been able to examine the ants in the National Museum, Melbourne, and Mr. J. C. Goudie, who has gone to great trouble to send me the ants of North-Western Victoria; Messrs. C. Barrett, H. W. Davey, F. E. Wilson, G. F. Hill, and W. F. Hill, have collected extensively, and sent me a considerable number of new and interesting species. Recently Mr. C. Okë has sent some interesting species; while to the energy and enthusiasm of the late Mr. L. B. Thorne I owe much valuable material and information. I am greatly indebted to these friends for their assistance.

Family FORMICIDÆ.

Sub-family DORYLINÆ, Leach.

This sub-family is not at present represented in the fauna of Victoria. Only three species are recorded for the whole of

Australia, and of these two are from Mackay, North Queensland, and one from Lismore, New South Wales.

Sub-family CERAPACHYINÆ, Forel.

Wheeler, *Psyche*, vol. XXVII, 2-3, p. 50, 1920;
Proc. Amer. Acad. Arts, Sc., 53, pp. 215-265, 17
figs., 1918.

Clark, Jour. Roy. Soc., W. Aust., vol. IX, pt. 2, pp.
72-89, 10 figs., 1923; vol. X, pp. 75-89, pls.
VI-VII, 1924.

This sub-family is well represented in Australia, about two-thirds of the known forms having been described from this country. At present they are poorly represented in Victoria: Only four species have been found, and these had previously been recorded from other States. No doubt many more will be discovered when the study of this interesting group is undertaken by local entomologists.

Genus *Eusphinctus*, Emery.

In this genus the abdomen is elongate and cylindrical, the segments are separated from each other by well-defined constrictions; the workers are eyeless, or with very minute eyes. This genus contains two subgenera, based on the number of antennal joints, these in *Eusphinctus* s.str. being 11-jointed, while in the other sub-genus, *Nothosphinctus*, they are 12-jointed. These are rare ants, generally found in small communities, under logs and stones. Wheeler considers that they are hypogæic; their nests and habits certainly suggest that they are so in Western Australia, where I found one colony foraging in the bush among half-buried logs. At present very little is known concerning their habits.

1. *EUSPHINCTUS STEINHEILI*, Forel. Belgrave
(F. E. Wilson).

Sphinctomyrmex (Eusphinctus) Steinheili, Forel.
Ann. Soc. Ent. Belg. 44, p. 72, 1900, ♀ (nec. ♂);
Emery, Gen. Insect. Fasc. 118, p. 7, 1911; Frog-
gatt, Agric. Gaz., N.S.W., p. 15, 1905.

Sphinctomyrmex (Eusphinctus) fallax, Forel.
Ann. Soc. Ent. Belg. 44, p. 73, 1900, ♂.

Eusphinctus (Eusphinctus) Steinheili, Forel.
Wheeler, Proc. Amer. Acad. Arts & Sc., 53, 3, pp.
225-228, figs. 1-2, 1918.

A specimen from Belgrave agrees perfectly with the description of this species. It is a small, reddish-brown ant.

PLATE II



STRIPED GREENHOOD.
Pterostylis repleta, R.Br.



BRITTLE GREENHOOD.
Pterostylis truncata, Fitz.

(Negatives by W. H. Nicholls)

barely one-quarter of an inch in length. It has no traces of eyes. This ant is also found in Queensland, New South Wales, and South Australia.

2. *EUSPHINCTUS STEINHEILI*, Forel, var. *HEDWIGÆ*, Forel
Fern-tree Gully (F. P. Spry).

Sphinctomyrmex (Eusphinctus) fallax, var. *hedwigæ*, Forel, Rev. Suisse, Zool. 18, p. 21, 1910, ♂ ♀;
Emery, Gen. Insect. Fasc. 118, p. 7, 1911.
Bull. Lab. Zool. Gen. Agrar. 8, p. 179, 1914.

Sphinctomyrmex hedwigæ, Forel, Froggatt, Agric.
Gaz. N.S.W., p. 15, 1905. Aust. Insects, p. 92, 1907.

Eusphinctus (Eusphinctus) Steinheili, var. *hedwigæ*, Forel. Wheeler, Proc. Amer. Acad. &
Arts & Sc., 53, 3, p. 228, 1918.

Several examples of this variety, in the collection of the National Museum, were found under stones at Fern-tree Gully, by the late Mr. F. P. Spry, and noted by him as rare. It is very close to the preceding species, and, apart from colour, which is more uniformly reddish, it is not easily distinguished from that species.

Genus *Phyracaces*, Emery.

The ants of this genus are most interesting, and may be regarded as the Foraging Ants of Australia. 35 species are known from all parts of the continent, but concerning their habits we have little information. Wheeler has published some notes on species from New South Wales, in his paper, published in 1918; and I have given a few notes on Western Australian species. From the notes so recorded, it is evident that the members of this genus obtain the most of their food supplies by raiding the nests of other ants, and carrying off the larvæ and pupæ to their own nests, where they are served as food to the *Phyracaces* larvæ.

In some cases the female is fully winged, as in most female ants; but in many cases the female is ergatoid, or worker-like, hardly to be distinguished from the workers except by her larger size. In other cases, the female has the thorax fully developed, but bears no wings. Even in the winged forms, the wing venation is more or less obsolete. Only two species have, so far, been found in Victoria, and both were previously recorded from New South Wales.

3. *PHYRACACES LARVATUS*, Wheeler. Fern-tree Gully (F. P. Spry); Beaconsfield, Belgrave (F. R. Wilson).

Wheeler, Proc. Amer. Acad. Arts & Sc., 53, 3, p. 257, fig. 15, 1918, ♀.

Clark, Jour. Roy. Soc. W. Aust., X, p. 83, pl. 7, figs. 1-6, 1924, ♀ ♂.

This species was originally found in New South Wales, but it appears to be more abundant in Victoria than in that State. The male and female were described from the material collected by Spry at Fern-tree Gully; the types of these are in the National Museum. In his notes, Mr. Wilson says:—"This ant is very rare; found under stones." It is a shining black ant, about a quarter of an inch in length, with the mandibles, cheeks, clypeus, legs, pygidium and incisures of the abdomen dark red.

4. *PHYRACACES SENESCENS*, Wheeler. Broadmeadows (C. Oke).

Wheeler, Proc. Amer. Acad. Arts & Sc., 53, 3, p. 259, fig. 16, 1918, ♂.

Clark, Jour. Roy. Soc. W. Aust., X, p. 87, 1924, ♀.

This species is slightly larger than the last; and easily distinguished from it by its greyish appearance, which it receives from the long, grey hairs on the body. It is black, with the mandibles, tips of the scapes, pygidium and parts of the legs castaneous.

BLUE-TONGUED LIZARD AND SNAILS.

Hearing a crunching noise under the floor of the verandah of my house at Maldon, I lifted some of the boards quietly and discovered a full-grown Blue-tongued Lizard, *Tiliqua scincoides*, making a meal on snails, *Helix aspersa*, which had affixed their shells to the brick wall. The lizard crushed the shells with the greatest ease, and ate them, with their tenants. In country districts Blue-tongued Lizards, and also the Shingle-back, *Trachysaurus rugosus*, often establish themselves under the floors of dwellings, etc.; and it is a common belief (shared also by the writer) that houses thus "protected" are shunned by snakes. Yet these harmless, interesting, and useful reptiles sometimes are killed by persons who think that they are "dangerous-looking."—J.C.G.

TWO AUTUMN GREENHOOD ORCHIDS.

By EDWARD E. PESCOTT, F.L.S.

The Greenhood family of orchids is with us all the year round. Hardly have the winter species ceased flowering, when the spring types are in bloom, then follow the summer forms, and soon those of the autumn months. None of the whole family has suffered from so much confusion as the Striped Greenhood, *Pterostylis reflexa*, R.Br. Its variable character, especially in size of the flower, and in height also has been chiefly responsible for this. Almost any low-growing, striped autumn Greenhood, having a fairly large flower, was classed as this species.

Indeed the Striped Greenhood itself is variable, and the southern Victorian form is a slender, rather tall species, with a medium-sized flower. The type form is very short, not often above 3 inches or 4 inches in height, with a wide and long flower, quite out of proportion with its total height. The type is well known in the Adelaide (S.A.) hills, but is not common in this State. Our best-known Victorian locality for the species was near Lubeck, many miles from Melbourne. It is, therefore, of great interest to orchid lovers to learn that, this autumn, Mr. W. H. Nicholls, a keen orchid collector, found a large number of the type form of the Striped Greenhood in the plain country, a few miles north of Melbourne. The plants were so plentiful that their rosettes of foliage literally carpeted the ground.

Mr. Nicholls and his fellow-collector, Mr. F. Bishop, are responsible for another, and even more important, "find." Collecting on the You Yangs, in April, 1923, they discovered a Greenhood, not previously obtained in this State, named *Pterostylis truncata*, Fitz. It grows at Mittagong, in New South Wales, and is figured in Fitzgerald's *Australian Orchids*. This species was found in great numbers, all over the You Yangs. The plants grow among Rock Fern and Snowy Mint Bush: one patch was found right on the summit of a huge granite boulder. The plant is a few inches in height, has a large flower, and narrow stem leaves. The labellum tapers to a point: the flower is striped brown.

green and white. The two points of the reflexed sepals are long and thin; so slender in fact that they readily break off, and the proposed common name, "Brittle Greenhood," has been suggested on that account.

In regard to the specific name, Fitzgerald says:—"I have named this species on account of the peculiar truncate form of its dorsal 'petal'; that refers to the shortening of the ventral portion of the 'hood.'"

The illustrations (Plate II) show these two species, natural size.

NEED FOR ENTOMOLOGICAL SOCIETY

In Brisbane an Entomological Society has been formed. Should there not be one for all Australia? I think it is needed. The Royal Australasian Ornithologists' Union had small beginnings; now it ranks with the Unions overseas, having a large membership, and a journal highly valued by bird students everywhere.

An Australian Entomological Society would, I am confident, meet with gradual success. Entomologists may not at present be numerous in the Commonwealth; but a Society would stimulate interest in insect life, and the field is wide enough for hundreds of workers. Perhaps our friends in Brisbane would be willing to consider an extension of *their* field, to admit to membership naturalists in all the States, and make the new body the Entomological Society of Australia. The move would surely be welcomed by their interstate friends.

The Brisbane Society is almost a pioneer. Only once before, I believe, has an institution of the kind existed in Australia. In 1863 the Entomological Society of New South Wales was founded. Its life was short: for after the publication of two volumes of Transactions it became merged into the Linnean Society of New South Wales. Its members included Sir William Macleay and the Rev. R. L. King. The Transactions are much sought after by Australian entomologists, as they contain valuable papers, such as Macleay's on the Insects of Gayndah, and King's on Pselaphidæ and Seydmeriidæ.—F. E. WILSON.

MORNINGTON NATURALISTS' CLUB.

The desire of the Nature lover to share his pleasure led to the formation of the Mornington Naturalists' Club. The writer called a meeting of those interested in his project. The invitation was responded to by five little girls, and to them a scheme was submitted. This was in October last; now we have a membership of more than 40 young nature students. The word "field" was purposely omitted from our title, as much of our study is "marine." Our badge is the shell *Sunetta exca-*
vata, mounted on blue ribbon; members also wear a black silk neckerchief, which bears the monogram "M.N.C." in red letters. To pay for the badge, etc., and any incidental expenses each member contributes 3d. per month. Meetings for instruction and microscopic study are held after school, on week-day afternoons. Talks on bird life, and other subjects, have been given by several visitors, including Miss Cooper, missionary from West China.

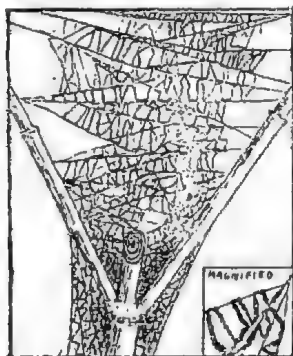
When the warmer days came, and membership increased we held our meetings on the beach, instead of at the leader's house. The usual programme was as follows:—A swim, some collecting, impromptu talks, tea (with which members came provided), arranging of future meetings and excursions, a game on the sand; and home before dark. For the winter months new arrangements were made, instruction in relays at the leader's house—different days for different subjects.

Those interested in botany are collecting for a local herbarium; shells and geological specimens are being added to a local collection, of which the leader's private collection forms the nucleus. For general meetings the use of the play pavilion in the school ground has been granted. Excursions have been held at frequent intervals. Many have been in the district: others have taken us further afield—two trips to the top of Arthur's Seat, by motor-waggon, two outings to Moorooduc, one to Frankston, and two to Melbourne (the first time with eight members, the second with 28). Members pay their own fares, a liberal concession being granted on the railways. Several members are learning to use a typewriter, and are thus able to type the names on the folders for the herbarium, and on cards for the specimens in the other collections.—REV. G. COX, Leader M.N.C.

THE SPIDER'S CARDING MACHINE.

By S. BUTLER.

Many of the snares made by spiders are ingenious. They are all spun from the silk "factory," situated on the floor of the abdomen. Silk of different kinds can be spun at the will of the operator: the softest down, to encircle the eggs, a waterproof covering for the cocoon, lines covered with a



Web of a Cribellate Spider.



Family Dictynidae, Genus Amaurobius

viscid fluid, that remind one of bird-limed sticks, strong cables to suspend the spider (it has been stated that four miles of this cable would weigh only one grain). Hackled snaring lines are the work of the carding machine, peculiar to the Cribellate spiders.

One of our most common Cribellate species is the Black House-spider. It is found almost everywhere. Out-houses and old fences abound with its webs. It is placed by arachnologists in the family Dictynidae, and is named *Amaurobius robustus*. The web is easily recognised. It has a tubular retreat, and woven out from this is the sheet, composed of straight, parallel foundation ropes with the fluffy snaring line laid between them in a zig-zag fashion.

This species is less than one inch in length; and, at first sight, appears to be black. The strong legs are of a dark rich brown colour. The front portion of the body, the cephalothorax, has a dark steel-iridescence, while the abdomen bears an inconspicuous pattern pocket. The eyes

are in two straight rows of four each, and some are of a pearly colour. *A. robustus* is a fine, well-groomed spider, very active when on the defence. A few years ago, at Black Rock, a rather formidable wasp was observed, teasing at a web, with the object of tempting the owner outside, and converting it into "paralysed provender" for wasp larvae, yet unborn. Without hesitation, the spider emerged, ready for battle. The wasp, with lightning speed, darted forward, and I expected to see the spider drop, fatally stabbed by a poisoned stiletto. Not so; the spider, raising itself, struck with the fangs, which just missed the wasp as it flew from the scene. I waited patiently for half an hour, but the wasp did not return.

Amourobius robustus, like all other Cribellate spiders, has a minute carding machine, which can be observed under the microscope, or a strong hand-lens. On the hind legs only, on the second last joint, is a beautiful little comb. It cannot be mistaken, as the teeth are as even as those of a toilet comb. This is the calamistrum (=a comb).



Calamistrum on Hind Leg

Touching the spinnerets, in front, is a small, oval plate, with a central division. This plate is really a spinneret. Highly magnified, it appears as a fine sieve; it is known as the cribellum (=a sieve). The calamistrum and the cribellum form the spider's carding-machine.

When a blanket is woven, its surfaces are hard and rough, as those of a bran sack. The soft, downy surface is produced by passing it under a rotating drum, covered with fine wire bristles, which tease out the surface. A somewhat similar result is obtained by the spider with its carding-machine.

The hackled snaring-line is spun through the sieve-plate. The two combs then attack this line, and tease out the threads; instead of having the glassy, rod-like nature of the foundation lines, it resembles a strand of frayed wool, and has power to entangle prey. A fly that is caught in it has small hope of escape. This line is laid in a zig-zag manner between the guy ropes, and when this feature is visible on a web, you may be certain that the owner has the comb and sieve-plate just described.

NOTES FROM FIELD AND STUDY

FERN REPRODUCTION.

The method of reproduction of ferns from spores, familiar to all students of plant life, is recorded as having remained a mystery until it was first discovered by an eminent Polish Naturalist, Count Suninski, in 1848. An additional method of extensive reproduction is by the development of new plants from creeping stems of parent plants. These stems, or rhizomes, are usually either closely under, or above, the surface of the ground. A familiar example of this mode is to be found in the Common Bracken Fern. Other examples are readily observable in the Rainbow Finger, Coral and Maiden-hair Ferns. A method of reproduction in some of our truncated, or distinctively-stemmed, native species, such as the King, Fishbone, Rough and Soft Tree Ferns, is in development of numerous crowns, for these, when carefully removed from the parent plant and treated, become well-established plants. Still another method is by the development of young plants in the form of bulbils at the apex of, or along or at the axes of the stems (rachis) of the fronds. Mother Fern, a native species, derives its botanical name, *Asplenium bulbiferum*, from this habit of reproduction. Another, the Common Shield Fern, which is familiar to our fern lovers, adopts a similar method. Although these bulbils may be removed and grown separately in pots or in the fernery, better results are obtained by pegging the fronds bearing them to the ground, and allowing the bulbils to root before severing them from the parent frond. The object of this note is to draw attention to the reproduction in the case of the well-known Staghorn and Elkhorn Ferns of New South Wales and Queensland, which many people grow in their ferneries. In addition to their ordinary method of reproduction from spores, which they bear in large patches of sori on their fertile fronds, young plants are borne in attachment to the older ones. Are they as adjoining crowns to the parent? Are they developed from the sheath of the parent plant or from the root system? Are they developments from the rhizomes? Are they bulbils, or may they adopt all these methods for their reproduction?—F. PITCHER.

SWIFT MOTHS' LARVAL LIFE.

The familiar large, brown moths, *Porina fuscomaculata*, Walker, that make their appearance every year, about May and June, and, attracted by light, are persistent in their efforts to get through windows, belong to the family *Hepialidae*. All the members of this family, commonly known as Swift Moths, pass their larval stages burrowing in timber, and some species, including *Porina*, specialise in the roots of trees. The pupæ of *Porina*, when ready to emerge, work up through the soil to the surface. Usually the skin ruptures when the pupa is only half above ground, and the moth is liberated.

In my garden, at East Malvern, some large Black Wattles, *Acacia mollissima*, are, apparently, badly infested by this species, as I counted no fewer than 23 pupæ cases, either projecting from, or lying on, the ground beneath the trees. Late one afternoon I saw a moth escaping from its case. These moths emerge at the commencement of the rainy season, when the ground becomes soft. They would, doubtless, perish in numbers if their season for emergence were summer, since the ground would be too hard for them then. Such tragedies occur in the beetle world. The grubs of our common Cetonids, *Eupœcila australasica*, Don, which live in decaying wood, when about to pupate, construct a rounded case, beautifully smooth inside and rough externally. During a long, dry spell, I found a number of these cases at Seaford. Each contained a beetle, perfect, but dead. The cases were very dry and hard, and, apparently, the beetles had been unable to liberate themselves. This probably explains the fact that, during the summer season, Cetonids generally are most abundant, after a day or two of rain.—
F. E. WILSON.

HABITS OF A MAILLE WASP.

A small wasp belonging to the genus *Bembex* is common during the summer in North-Western Victoria. It has most engaging ways, and one outstanding characteristic, in which it differs materially from most other species of wasps; it makes periodical visits to its burrow, with food for its offspring. This appears to me to reveal a higher order of intelligence than is shown by a wasp that, after paralysing its prey, placing it in a burrow or prepared cell, and laying an

egg upon it, troubles no more. The devotion of the ever-busy, active *Bembex* to its offspring is, at times, charming to observe. The wasp shows as much concern, on returning to its broken burrow, as do birds of many species when their eggs have been stolen. I was particularly captivated by the solicitude for her offspring, and the utter disregard for her own safety, displayed by one wasp, whose burrow I was examining. As I excavated with the point of a knife, she did her utmost to fill in the broken tunnel, her tiny forelegs working feverishly. I had to push her aside several times as I worked. Though in search of knowledge, I was tempted to let the insect win the day. The pupa is now housed in a pill-box. One summer's day it will emerge, and when I have satisfied my curiosity, and further enriched my note-book, young *Bembex* will have the freedom of the sands.—L.G.G.

"BILL BAILLIE"—A PET OPOSSUM.

For nearly 13 years a Silver-grey, or Common, Opossum *Trichosurus vulpecula*, has lived in captivity. His mother was killed by dogs, and he was taken from her pouch. A soft, pink and grey ball of fur, with bright, bead-like eyes, he hardly filled the cup of my hands when presented to me. We had been reading the late Mrs. Ellis Rowan's book, "Bill Baillie," and the name of her animal hero was bestowed upon the newcomer.

Our pet was so young that it became a problem how to feed him. The problem was solved by soaking one end of a strip of flannel in milk, in a saucer, and giving the other end to "Bill Baillie." He quickly drained the saucer. Later he was fed from a teaspoon. No wild creature can be perfectly contented in captivity; but our opossum became so tame that we realised that freedom would mean for him almost certain destruction by dogs. So a large, wire-netted enclosure was provided for him, with as much "wild" comfort as possible. There he has lived, since 1913, apparently quite happily, during the most of the time: occasionally we have been conscious of a dumb pleading for freedom, and have almost regretted that we gave "Bill Baillie" the chance of life in his infancy. He has been fed on gum leaves, fruit, vegetables, nuts, thistles, dock leaves, sorrel, and bread and milk, or bread and jam. Lately he has shown signs of ageing; his appetite is still good, but he is less active, and

spends more time now in his grass-lined box. He has just returned from a fortnight's "holiday." He had been ill, so we took him with us to Healesville. The change has almost rejuvenated him. He showed plainly his pleasure at being back in the old quarters.

Our experience will deter us from ever again caging a wild creature. Though "Bill," doubtless, has lived longer than he would have done in freedom, and enjoyed more comfort, too, I think that he would have preferred life in the bush, with all its dangers.—E.C.

OUR ONLY POPPY.

In the *Kew Bulletin*, No. 4, 1905, J. Hutchinson ("Contributions towards a Phylogenetic Classification of Flowering Plants, V") remarks on the paucity of the Papaveraceae in the Southern Hemisphere, and refers to the only representative in South Africa as *Papaver aculeatum*, and to our one species as *P. horridum*. The three chief areas of concentration of this family are in California, whence comes *Eschscholtzia*, the eastern Mediterranean and Western China, the home of so many lovely *Meconopsis*, among which is Farrar's "beloved Celestial Poppy," with flowers of every shade, from pure white through all tones of azure, mauve and lilac to clean pink. In the same *Bulletin*, Braid revises the *Alphitonias*, a genus of the *Rhamnaceae*, ranging from Borneo to Hawaii, and from the Philippines to northern New South Wales. He recognises five Australian species hitherto lumped in *A. excelsa*; this is well known as a valuable tree yielding fine timber, good tanning bark and foliage useful as fodder. The leaves, it is interesting to note, froth in water, probably from the presence of saponin, and are used by local school children to clean inky fingers. The bark from young shoots, especially of *A. Petrici*, has a strong odour of sarsaparilla.—C.S.S.

A USEFUL GRASS.

In the *Journal of Ecology*, January, 1925, appears an account, by F. W. Oliver, of the grass *Spartina Townsendii*, which somewhat miraculously made its appearance in the sheltered waters of Southampton, more than 50 years ago. Since then it has extended its range for nearly 20 miles on each side of the Isle of Wight, and has appeared also on the

French coast opposite, where it has spread even more quickly and widely. This grass is described as being better fitted for the reclamation and stabilising of muddy foreshores than any other in the world, and it is well worth the consideration of our port authorities. The normal habitat of *Spartina* is soft, tidal mud, extending not further than three feet below high-water mark of spring tides, where it ousts *Zostera nana*, when this exists, and even overwhelms *Scirpus maritimus* on the landward side. Colonisation commences by the appearance of little scattered tufts in the soft mud, arising from seed. These extend by creeping stolons, which become anchored by long, unbranched roots, going as deeply as four feet, and by tufted, branched roots near the surface, especially concerned with nutrition. The tufts, which reach a height of two or three feet, in time coalesce, the surface is raised by silting, the mud eventually consolidated, and meadowing results. As a fodder the *Spartina* is relished by beasts of all kinds, and it is cut and stacked for their winter use.—C.S.S.

GIPPSLAND PERCH AT BAIRNSDALE.

While fishing on Easter Monday, above the waterworks, Bairnsdale Water Supply, my younger son and I hooked eight Gippsland perch, *Perca latiuscula*, Stead. All were small, one being only 8½ inches in length, and the others 10 inches, or a little over. From the angler's point of view the catch was disappointing; but as the small size of these examples points to the possibility of the species breeding in the river, the matter is of great interest to those concerned in the preservation of our indigenous fishes. Unfortunately, nothing is known as to the breeding habits of this splendid fish, admirable from both its sporting and edible qualities.—E.C.

HOUSE-FLIES AND BUSH-FLIES.

In references to the menace to public health and the almost intolerable annoyance caused by flies, in our cities, suburbs, and country districts, two distinct species are almost invariably confused. Few discriminate between the common House-fly, *Musca domestica*, and the so-called Bush-fly, *M. vetustissima*. Both are exceedingly abundant, and both are

widely distributed, the former throughout the temperate and tropical regions of the world, the latter throughout this continent and in India. The habits of the one are too disgusting and too well known to require mention here; those of the other, if objectionable in the extreme, can be enumerated only in part for want of more precise knowledge.

The House-fly is pre-eminently a denizen of our dwellings, yards, food shops and restaurants. Its abundance, or scarcity, during the summer and autumn months, is determined by the amount and nature of the filth to which it has access. Wire-gauze would be a drug on the market, instead of a costly necessity, if our municipal enactments were strictly enforced.

The Bush-fly prefers open spaces—suburban streets, gardens, beaches, grazing lands, forests and plains, and even the arid interior of the Continent. It rarely enters houses, and is never seen on exposed food indoors. It is not dependent upon filth for its existence, and is as abundant in uninhabited territory, plains and tablelands of the interior, and the islands of the Kimberley Coast, as it is in our populous seaside resorts. Very little is known of its breeding habits, but it is safe to say that its numbers would not be materially reduced by the application of regulations designed for the control of the House-fly.

G.F.H.

REVISION OF THE EUCALYPTS.

The sixty-fourth part of Mr. J. H. Maiden's *Critical Revision of the Genus Eucalyptus* is devoted to the description of the seeds, commenced in the previous part. As with every other feature in the species of this genus, there is great diversity in these. In size they vary from $\frac{1}{2}$ to 16 mm. long and from $\frac{1}{2}$ to 7 mm. broad, the smallest being derived from *E. dealbata* and the largest from *E. calophylla*. In more than 100 kinds the length does not exceed 2 mm.

Though there seems to be no constant correspondence between size of seed and capsule, those of *E. Ravenetiana* for example, with the smallest fruits of all, being as large as those

of our Woollybutt, *E. longifolia*; generally speaking, the large forest trees appear to have the smallest fruits and seeds, and the scrubby, dry country species the largest. In dealing with their vitality, Mr. Maiden states he has no difficulty in getting germination up to 30 years, though Professor A. J. Ewart and Dr. Cuthbert Hall were not so successful, the latter failing to raise seedlings from material older than 18 years. Usually the sterile seeds, which serve the purpose of packing, outnumber the larger and darker fertile ones. In the Bloodwoods there are only one of the latter and a few of the others in each cell, but the numbers in other species are not given.

In grouping the seeds into a score or so of series Mr. Maiden has regard to the presence of a wing or membranous fringe, its extent and position—this feature is most pronounced in the Bloodwoods—the shape and sculpture, the position of the hilum, the colour, from light brown to jet black, and to the nature of the surface of the testa, which may be smooth, striated, pitted or scurfy.

It will be news to many that when in sore straits, perhaps only in times when even grass seeds and nardoo fail them, the seeds of at least one species, a Coolabah, *E. bicolor*, serve as food for the natives of West Central Queensland, who prepare them much in the way they do the sporocarps of the *Marsilea*.

It is now 22 years since the appearance of the first part of Mr. Maiden's *magnum opus*, and the completion of it is not yet, though it seems to be within measurable distance. Three years ago, when part 53 was published, he was of opinion it would take at least 65 parts to deal with the total of perhaps 350 species and to contain all the material required to do adequate justice to his subject.

However, there are still more species to be described. *Burracoppinensis*, *Blossomei* and *Staeri* are noticed, which will bring the number to 336, and no doubt there are others. The seedlings, too, have yet to be figured, and, lastly, there is to come the enormous key which was his main object in engaging in his formidable task, and will be its fitting and triumphant culmination. It is therefore likely that the estimate, at least in regard to the number of parts, will be considerably exceeded.

C.S.S.

The Victorian Naturalist

VOL. XLII.—No. 4.

AUGUST 7, 1925

No. 500.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 13th July, 1925. The President, Mr. Geo. Coghill, occupied the chair, and about fifty members and friends were present.

ELECTION OF MEMBERS.

On a ballot being taken, the following were duly elected as members of the Club:—As ordinary members: Mrs. Geo. Coghill, 17 Monomeath Avenue, Canterbury; Mr. S. F. Mann, Caramut; and Mr. A. R. Mills, LL.B., 430 Little Collins Street, Melbourne. As associate members: Master Colin Keith Fraser, Charles Street, Kew, and Master Ronald Ian Wallace, c/o Prof. Wallace, Kew.

GENERAL BUSINESS.

Mr. F. Pitcher moved, "That this Club protests against the proposed destruction of the trees in Victoria Parade." Seconded by Mr. A. E. Rodda. Messrs. McColl, F. G. A. Barnard and A. D. Hardy, and the President, took part in the discussion that followed. The motion was carried unanimously.

PAPERS.

1. By Mr. J. C. Goudie—"Notes on the Coleoptera of North-Western Victoria," Part XIII. The author dealt with beetles belonging to the families Brentidæ, Anthribidæ, and Cerambycidæ (several very fine and rare species of Longicorns were included in the list).

Messrs. C. Oke, D. Best and Hardy discussed the paper.

2. By Mr. T. S. Hart, M.A.—"The Victorian Species of *Cassytha*." The author described the differences between the five species, their range, and habits. The paper was discussed by Messrs. H. B. Williamson, Hardy, Pitcher and the President.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—Specimen of *Cassytha paniculata*.

By Mr. C. Daley, B.A., F.L.S.—Views of Californian Alligator Farm.

By Mr. J. C. Goudie—Case containing species of Longicorn beetles (Cerambycidæ), from Sea Lake, Birchip district, Victoria, in illustration of his paper.

By Mr. J. A. Kershaw—*Nautilus pompilius*, found on Three-mile Beach, at National Park, Wilson's Promontory, by Mr. W. H. Ferguson, May, 1925. A most unusual occurrence.

By Mr. V. H. Miller—Wattle Scale, *Lecanium buccatum*.

By Mr. C. Oke—Three species of Victorian Swift-moths, *Porina australis*, *P. fuscumaculata*, and *Oncoptera intricata*. The larvae of these moths feed on grass roots.

By Mr. A. E. Rodda—Pyromorphite (Chloro-phosphate of Lead), from Queensland.

By Mr. E. E. Pescott, F.L.S.—Growing plant of the "Wheat" orchid, *Bulbophyllum Shepherdii*, F.v.M., in flower. Native to New South Wales and Queensland.

By Mr. J. Searle—Small Chalcid wasp, and "shell" of aphid from which the parasite emerged. (Shown under microscope.)

By Mr. P. R. H. St. John—Herbarium specimens of (1) *Adiantum capillus veneris* (Linn.), English Maiden-hair Fern, Mt Evelyn, 18th February, 1925 (new for Victoria); (2) *Casuarina suberosa* (Otto and Diet), variety *pendula*, the Drooping Sheoke, from Frankston, April, 1925; (3) *Eucalyptus phlebophylla* (F. von M.), Weeping Cabbage Gum, from Frankston, April, 1925; (4) *Eucalyptus acervula* (Hook fil), Red Gum of Tasmania, Frankston, 5th July, 1925; (5) *Eucalyptus acaciiformis* (Dean and Maiden), Red Peppermint of New South Wales, grown by Mr. Alistair Clarke, Bulla, Vic., 1, 2, 3 and 4, collected by exhibitor.

By Mr. H. B. Williamson, F.L.S.—Photographs of large Dodder-laurel.

THE BATHURST BURR.

One of the troublesome weeds of Victoria, *Xanthium spinosum*, is ubiquitous, even being found near Anzac Beach, on Gallipoli. It is generally considered to be a native of South America, and to have been introduced into Southern Europe between the years 1700-1750. Semi-fossilised fruits have, however, now been found in Neolithic deposits in Bulgaria. They have been carefully examined at the Royal Botanic Gardens, Kew, and their identity established. The "fruits" had been collected in considerable quantity and stored, as if for use as food or fodder. The discovery would indicate that the species existed in Europe long before the date accepted by Thellung (Kew "Bulletin," No. 5, 1923).—A.J.T.

THE VICTORIAN SPECIES OF CASSYTHA.

By T. S. HART, M.A.

Five species of *Cassytha* have been recorded as Victorian, but of these *C. paniculata* is given only as from the Hume River, and is therefore indicated in the Census as doubtfully Victorian. The other six Australian species occur in Western Australia and the northern part of the continent.

Cassytha melantha, the Large Dodder-laurel, and *C. glabella*, the Tangled Dodder-laurel, are clearly defined species; but the boundary between the other two species (*C. pubescens* and *C. phaeolasia*) seems to be doubtful. The authority for *C. phaeolasia*, Spiked Dodder-laurel, is W. von Mueller, *Fragmenta* V. (1866), where it appears as a variety of *C. paniculata*, or possibly a distinct species. The note may be thus translated:—"Of this (that is, *paniculata*) the variety *phaeolasia*, unless by this name is to be noted a distinct species, from the coast of Twofold Bay, is at once to be recognised by the rusty-tomentose fruits." A little later there follows a note on *C. pubescens*, in which a variety, *macrostachya*, is mentioned.

From the original note, *C. phaeolasia* would be expected to have fruits like *C. paniculata*, except for the hairs, that is, ribbed fruits. (The term fruit is used to include the succulent part, not merely the matured carpel.) Bentham (1870), who would, no doubt, be at some disadvantage as regards the direct observation of the succulent fruits, makes a distinction in the lengthening of the spike, as well as in the shape of the fruiting perianth; so also Mueller, in the *Key to the System of Victorian Plants* (1888). Without fruit, any long-spiked pubescens might be merged in *phaeolasia*. Bentham says that *C. phaeolasia* is very near *C. pubescens*, differing from it in inflorescence, and perhaps in the form of its fruit, but he had not seen the fruit quite ripe. Fruiting perianths of *C. phaeolasia* are given as obovoid, or pear shaped those of *C. pubescens* as globular.

Mueller, in *Native Plants of Victoria Succinctly Defined* (1879), omits *C. phaeolasia*; possibly he doubted it as Victorian: perhaps it is merged in *pubescens*. If this is not an error in compiling, it agrees with a hesitation to remove the variety *macrostachya* from *C. pubescens*, for this variety is undoubtedly Victorian, as will appear below.

Having obtained specimens with strongly-ribbed and brownish tomentose fruits, at Eagle Point, near Bairnsdale, I concluded, from examination of the description, that these were typical *phaeolasia*. At the same time I read of the variety *macrostachya* of *pubescens*.

The fruits of *C. pubescens*, as collected at Black Rock, though variable in relation of width to height, showing both squat and relatively tall forms, are, as the Baron expresses it in the *Fragmenta*, "gently-angled;" looked at end on, the departure from a circular outline is slight, so that calling them globular is not misleading.

Through the courtesy of the late Mr. J. R. Tovey, I was able to examine the National Herbarium specimens, and found there, in the *C. phaeolasia* package, the following:—

A specimen labelled *C. pubescens macrostachya*, from Portland, one of Bentham's localities for *C. phaeolasia*. I see no sufficient reason for separating this specimen from *C. pubescens*. No fruits were seen. Elongated spikes are present.

Another, *C. pubescens*, shrubby at the coast near Brighton (1853), F von M. The spikes have flowers separate in the lower part. No fruits. Brighton is one of Bentham's localities for *C. phaeolasia*.

Another, *C. pubescens* on *Melaleucis*, at the Yarra River (1853). Dr. M. The shrunken fruit in the packet do not show ribs. The flowers are mostly separate.

These specimens, though retaining *C. pubescens* labels, are found with *C. Phaeolasia*, indicating a partial acquiescence in Bentham's arrangement; but it is not known to me when they were so placed. They represent *C. pubescens*, var. *macrostachya*.

With these I found two other examples, which are clearly the Baron's *phaeolasia*, namely:—

A specimen labelled "Heath ground, near the Womboyne, Drupe 6-angular pyriform, brownish, hairy, D.M., Sept. '60." This has with it a packet from the same locality Heath ground, near the Womboyne, *Cassyltha paniculata*. The date is before the separation of *C. phaeolasia* from *C. paniculata*. The dry fruits show ribs, and are brown-hairy.

Another specimen has two labels, "*C. phaeolasia*, Ferd. Mueller, East Gippsland," and "*Cassyltha*, Womboyne." The buds are distinctly brown-hairy.

The Womboyne River is about 18 miles north of Cape Howe, hence these examples are not Victorian. The specimens I have from Eagle Point, and other localities about the

Gippsland Lakes, may be placed as *C. phaeolusia* in the original sense, with these Wombeyne specimens.

Turning then to the Herbarium *C. pubescens* packet, there are found *C. pubescens*, rocky hills near Swanport; a spike on this shows many points of attachment of flowers an eighth of an inch, or perhaps more, apart. Also, *C. pubescens*, R.Br., var. *divisa*, Mt. Lofty Ranges, at the Cataract, F.M., '49; and another label which, translated, reads "*C. pubescens*, Mt. Lofty. Fruit opaque, green, very gently six-angled, with an umbo at the apex." (I have translated Latin labels when such occur.) These may be placed with var. *macrostachya*. I have not found any other reference to var. *divisa*.

I then proceeded to look for long-spiked *C. pubescens*. On low shrubs east of Black Rock (Elden's Park), *C. pubescens* was in great abundance, all plants noted having the typical short-spiked inflorescence. On searching in tall tea tree further south, on the inner side of the Beach Road, spikes 1.9 to 2.7 inches long were found. The fruits were all referable to *pubescens*.

I have also found elongated spikes in *Melaleuca* scrub at Scoresby, and while one patch had the aspect, on a general view, of a patch referred to *phaeolusia* at Eagle Point, and possibly some fruits were a little more angular, I saw no sufficient reason to remove the Scoresby specimens from *C. pubescens*. It should be noticed that the hairs, and often partly-reddish fruits, in *C. pubescens* are quite distinct from those of *phaeolusia*. In *pubescens*, the skin colour of the fruit shows through, with minute, scattered hairs. In *phaeolusia* the hairs are denser and brownish.

I have come to these conclusions:—

That typical *C. phaeolusia*, F.v.M., is that form in which the fruit is strongly angled, or ribbed, and has a rusty tomentum. Its fruits are distinct in form from those of *C. pubescens*. The National Herbarium specimens seen by me do not show it as Victorian, but it occurs freely about the Gippsland Lakes. Eagle Point is, so far, the most inland locality. Shady conditions may be favourable to the elongation of the spikes.

As regards hosts, a few of my notes mention weak attachments to certain species, and it is not unlikely that the parasite flourishes more on some plants than on others. Starting from the soil, the plant is less likely to grow in cultivated lands, where it may be destroyed before permanently establishing itself. Attachments to introduced plants are, therefore, mainly to be expected where these plants have run

wild, or are under semi-natural plantation conditions. I have, however, a few examples of its occurrence on introduced plants.

Mr. A. D. Hardy notes *C. melantha* on Furze, *Ulex Europæus* at Studley Park. I have observed the same species on Willows, *Salix alba*, on the Mitchell River above Bairnsdale, but the attack was light compared with that on the *Tristania*, from which it had spread. I have observed probably *C. pubescens* on a pine, probably *P. Laricio*, at Creswick, attaching to the needles; and also on Blackberry, at Scoresby. A *Cassytha*, doubtless the same species, I saw on *Pittosporum undulatum*, near Mornington, and *C. glabella*, attached to a self-sown pine, near Frankston, the pine being still small and among the low scrub.

Prof. A. J. Ewart has shown that cotyledons do not appear in the young seedling, and that there is the very peculiar absorption of the store of material in the seed by the tip of the shoot. Bentham records that the cotyledons are distinct at an early stage, though consolidated later, assuming the appearance of a fleshy endosperm. The two cotyledons can be found on examination, and on several natural seedlings there appear two minute scars, or marks, below the first scale leaf, which may be the original points of attachment of the cotyledons. In having large cotyledons, the seed has a general character of the *Lauracæ*.

The succulent fruit is derived from the receptacle of the flower, the hard interior being derived from the carpel, and though the family is described as monocarpellary, a six-rayed character appears, at least sometimes, in the summit of this hard portion. The marked, or gentle, six-angled character, when seen in the succulent part, is preserving or agreeing with the six-parted perianth.

I have taken several seedlings on two occasions, in the southern part of Moornung, south-west of Bairnsdale. These were, no doubt, all *C. melantha*, under which they were found: though, as the fruit is probably taken by birds, they were not necessarily from that particular plant. I have also taken natural seedlings, either *phacelusia* or *pubescens*, at Eagle Point Park.

SYNOPSIS OF VICTORIAN CASSYTHAS.

Fruit ellipsoid, red or yellow; flowers in clusters; plant glabrous: stems and branches threadlike. *C. glabella*.

Fruit globular, green; spikes short or almost capitate: plant glabrous, except the flowers: stems and branches thick. *C. melantha*.

Fruit depressed, globular to ovate-globular, often with a colour tinge, very gently six-angled on careful inspection, minutely puberulent; spikes short or elongated; plant more or less pubescent; stems moderately thick.

C. pubescens.

Fruit pear-shaped, ribbed at least in typical examples, distinctly hairy; spike elongated (? is it always elongated early); plant more or less pubescent; stems moderately thick.

C. phaeolagis.

Fruit ribbed, glabrous or nearly so; spike usually elongated, sometimes branched; plant glabrous or nearly so.

C. paniculata (doubtfully Victorian).

NOTES ON THE FORAMINIFERA.

By F. CHAPMAN, A.L.S.

The study of that fascinating group of lowly animals, the foraminifera, has of late been brought to the fore by their increasing usefulness in the determination of the age of rock groups, and as constituting indicators of former geographical conditions. They have been also useful in oil-finding, as evidenced by the establishment, in America, of at least two flourishing Bureaus for Foraminiferal Research.

The literature on the subject is enormous, but that should not deter any naturalist from taking up the study of these little shells; for by seeking to know the principal types, ascertained from text-books on the subject, such as Brady's Challenger Report and the recent work by Cushman, published by the United States National Museum, a good working knowledge can soon be acquired.

It is remarkable to see a decided renaissance of enquiry made in recent years in regard to the foraminifera. Since this interest has spread even to our own Club, and the fraternal Society of Microscopists, it may not be out of place for an old worker to contribute a few notes for beginners in this study. Many successful students of nature in the past commenced by merely collecting. There is very much to be said in favour of this, and little against it. Gathering and identifying species often leads to a search for further knowledge, and every one can add to the "cairn" of facts.

Since an all-round student of nature should know something of geology, as well as of zoology, it is assumed that the

collector of foraminifera desire to know where and how to obtain these tiny shells, both in the rocks and in the living state. Fossil foraminifera are, perhaps, rather difficult to find in Victorian rocks older than the Tertiary, though most beautiful specimens can be washed out of the Chalk of Clingin, Western Australia. If, however, one has a friend who collects Tertiary shells, and who is in the habit of bringing home large bags of marl and other shell-rock, he might arrange to take over cast-off siftings, since these will generally prove a mine of microzoa. Such material may come from Torquay, from Muddy Creek, or from the mullock heaps of the Altona Bay coal-shaft. But in every case the position of the bed should also be noted as well as the locality.

Prolific strata can be found at Torquay, in the lower part of the cliff, as at Bird Rock, but some of the higher layers are equally profitable. Towards Rocky Point, beyond Fisherman's Steps, for example, a soapy marl band comes down to the shore. This band contains large numbers of *Globigerina*, which points to its pelagic, or open sea character, in the Miocene period, whilst there are some beautiful forms of *Cornuspira* and *Lagena* also present.

The marls of the fossiliferous beds at Torquay do not require much washing, only so far as to remove the flocculent clay which binds the particles. After drying, the foraminiferous material can be sifted into grades to facilitate the sorting.

As regards living forms, probably the richest shore-line deposit near to Melbourne is the strand of Altona Bay. But the results will be variable, according to the season of the year, for so much depends on the conditions of tides and currents. The muds of shallow water round piles and groynes are often a rich source of wonderful glassy *Lagena*.

No matter where we obtain our foraminiferal material, something of interest is always sure to be discovered, and when we examine their variable and ornate shells we cannot wonder that they were first favourites among the older microscopists, who were then only equipped with an ordinary magnifying glass, or a simple microscope such as the herbalists used.

Some practical hints as to collecting foraminifera may be found in the *Naturalist* for April, 1910; and the known Victorian species of littoral forms are listed in my paper, "Recent Foraminifera of Victoria: Some Littoral Gatherings," published by the Quekett Microscopical Club, November, 1907.

THE VICTORIAN TERMITES.

By G. F. HILL.

Notwithstanding that "White-ants" are frequently stated to be the cause of considerable damage to forest, ornamental, and cultivated trees, and to fences, buildings, etc., less is known of the Termite fauna of this State than of that of any other part of the Commonwealth, with the exception of Tasmania and South Australia.

In his list of Australian Termites, Mjöberg (1920) recorded only five species from Victoria, one of which, *Coptotermes lacteus* (Frogg.), is unknown to me from this State, and is not referred to in the following notes. The number, including described and undescribed species, is now known to be 16, representing nine genera, as follows:—*Stolotermes*, 1; *Calotermes*, 4; *Porotermes*, 2; *Leucotermes*, 1; *Coptotermes*, 2; *Rhinotermes*, 1; *Eutermes*, 2; *Hamitermes*, 1; *Microcerotermes*, 2. The soldier caste of all of the above species, and the imago also of 13 of them, are known from Victoria; the remaining three species may be identical with species known in all eastes from other States.

So little systematic collecting has been done in this group of insects in Victoria, that one may safely predict many additions to the above total of species, though it is improbable that more than one of the four remaining Australian genera will be found to be represented.

Few authorities are in agreement regarding the classification of the Termites, and no system yet devised has been generally accepted, though most of the genera, and many of the species, are easily recognised. The following notes and figures (more or less diagrammatic) will be found sufficient to enable one to identify most, if not all, of the species enumerated, without reference to the long, technical descriptions often so necessary for the differentiation of all the species of a faunal region.

It should be mentioned, however, that in some genera, e.g., *Coptotermes*, *Rhinotermes*, *Microcerotermes*, specific determinations cannot always be made from soldiers and workers only; that while the imagoes of a given species rarely vary appreciably, soldiers, even from the same colony, may show marked differences in the size and shape of the head. e.g., *Calotermes*, *Porotermes*, *Microcerotermes*; that in some species there may be two dissimilar forms of soldiers in the

same colony, e.g., *Rhinotermes* and *Eutermes*; that from two to five distinct species may be more or less closely associated in the same colony; that in species in which two forms of soldiers are normally present one may be absent, e.g., in young colonies of *Rhinotermes*; and that the functions of a true king and queen (i.e., reproductive forms derived from winged imagos) may be performed by apterous or brachypterous adult males and females, or by one to several true kings mated with from one to a hundred or more apterous females.

As a rule, the genus is most readily determined from the soldier caste, and the species from the imago. The worker caste (absent in *Calotermes* and *Porotermes*) generally possesses good generic characters, but is often practically useless in attempting specific determinations.

The following list of species, with brief descriptions of each, comprise the Termite fauna of Victoria, as at present known to me. Measurements are given in millimetres (approximately $1/25$ inch):—

Stolotermes victoriensis, Hill: Imago, length with wings 11.00, without wings 6.5; a small, dark-brown species, with fuscous wings, very small pronotum, no ocelli; eyes small, prominent; antennæ 16-jointed; anterior margin of wing with several short, stout veins, running diagonally upwards to the costa; cerci 3-jointed. Soldier: Total length, 7.9.00; head with mandibles, 3.30-3.60; head much flattened, jaws bent downwards slightly, with two broad and one narrow teeth on left and two broad teeth on right; teeth large, leaf-like, and directed forward; antennæ 15-jointed; eyes black and very distinct; pronotum small; cerci 3-jointed. Found in small colonies in rotten logs, in damp, heavily-timbered, hilly, or mountainous country, winged imagos present in January. The four remaining species are from Tasmania (1), New Zealand (1), and Queensland (2).

Calotermes (Figs. 1 and 8): Small to very large species: imago with ocelli, pronotum large, reniform, arched, wing margins without hairs, larger veins crowded towards anterior border (sub-genus *Neotermes*), remaining veins usually very indistinct, empodium present between claws, cerci 2-jointed. Soldier: Head large, much longer than wide, more or less parallel on sides, mandibles large, with stout teeth on the inner margin, pronotum very large, reniform, wider than head, very few hairs on head, thorax and abdomen, empodium present, cerci, two-jointed.

Calotermes insularis (White): A large, yellow species: length with wings 25.50, without wings 14.00, expanse of

wings up to 45.00. Soldier: Total length about 15.00, head with mandibles 7.00; head orange-rufous, with long, slender mandibles; antennæ 15-17 joints, third joint very little larger than second and fourth (sub-genus *Neoterмес*)

This is the species referred to by French in "Destructive Insects of Victoria," Part 2, as *Termes australis*, Walker. Lives in small colonies in living trees; found in various parts of Southern Victoria, winged forms present in January.

Calotermes oldfieldi, Hill: Length with wings 15.00, without wings 9.00; a yellowish-brown species, distinguished from the preceding species in the winged form by its smaller size, the median vein of the forewing midway between the cubitus and radial sector, weakly chitinized (sub-genus *Calotermes*), and in the soldier caste by its smaller size (total length 11.50, head with mandibles about 4.50), antennæ 13-18-jointed, third joint much larger than second and fourth, club-shaped (sub-genus *Calotermes*).

Lives in living and dead trees; winged forms present from February to July; has been found at Keilor and in the Mallee district.

Calotermes iridipennis, Frogg: Length with wings 11.00, without wings 7.00; antenna 15-jointed. Distinguished from either of the above by its smaller size, very dark-brown colour, dark iridescent wings and absence of short diagonal branches from the radial sector towards the costal margin (sub-genus *Glyptotermes*). Soldier: Total length 9.00-10.00, head with mandibles 3.15-4.10; head orange-rufous, long and cylindrical, mandibles short and stout; antennæ 13-15-jointed. Distinguished from the preceding species by its smaller size, cylindrical head and shorter mandibles.

Found in living and dead trees, in fairly large colonies, generally with several kings and queens. It is a destructive species in the public gardens of the city and suburbs, and has been found at Beaconsfield and Frankston.

Calotermes rufinotum, Hill: Length with wings 9.00-9.50, without wings 4.50; head and pronotum orange, wings dark fuscous, remainder of insect nearly black. Distinguished from the preceding species by its smaller size, colour of head and pronotum, and presence of short, oblique veins extending from the radial sector towards costal margin. Soldier: Total length 6.50, head with mandibles 2.20; head long and narrow, cylindrical, mandibles short and stout.

Lives in small colonies, in living or dead trees; sometimes attacks building timber; has been taken in the vicinity of Melbourne, Gembrook and Lakes Entrance.

Parotermes: Medium to large, light-brownish species, almost devoid of hairs. Imago without ocelli, pronotum small, reniform, not markedly arched; principal wing veins crowded together near costal margin; numerous small, oblique veins extending from the radial sector towards the costal margin; no empodium between claws; cerci five-jointed. Soldier: Medium to very large size, with broad, flattened head, powerful mandibles, with two very large teeth on apical half of each; eyes pale, rudimentary; pronotum of moderate size, but much narrower than head; no empodium, cerci five-jointed.

Parotermes adumsoni, Frogg: Length with wings 14.00-15.00, without wings 7.00-8.00. Soldier: Total length 8.75-11.25, head with mandibles 3.36-4.67.

Lives in colonies of moderate size, in living or dead trees; winged forms present in March. Has been found in suburbs of Melbourne, and at Ringwood, Tarwin, and Lakes Entrance.

Parotermes grandis, Holmgren: Winged form not known. Dealtated imago (king and queen): Length 9.50-11.25; otherwise similar to preceding species. Soldier: Total length 10.50-14.50, head with mandibles 4.20-7.00; otherwise similar to preceding species.

Found in the mountain and hilly districts of South and South-eastern Victoria. Exceedingly destructive to Eucalypts; remarkable for the variation in size and shape of head of soldiers; possibly a mountain form of the preceding species. One species is known from Tasmania, one from South Africa, and one from Chili.

Leucotermes ferox, Frogg: Length with wings 10.25, without wings 4.50-5.15; small species: upper surface very dark brown, lower surface and legs yellowish; wings fuscous, stumps of forewings much larger than, but not overlapping, those of hindwings; clypeus strongly convex, with medium suture; head round; eyes very small and not projecting; ocelli very small (in certain species only a proportion of the imagos have ocelli, but in this they appear to be invariably present); fontanelle small but distinct, circular, situated posteriorly of an imaginary line joining the posterior margin of the eyes; antennæ 16-jointed; pronotum moderately large, slightly narrower than head, and a little wider than long. Soldier (Fig. 2): Total length 5.00, head with mandibles 2.50; head yellow, long and narrow, with long, sabre-shaped mandibles, without teeth or serrations, excepting at the extreme base of the left mandible, where there is a large thorn-like, blunt tooth only visible in cleared or dissected

specimens; labrum very long, cone-shaped, nearly half as long as mandibles; fontanelle as in imago, situated about midway between apex of mandibles and base of head; antennæ 15-jointed (rarely 16-jointed).

Found in small colonies in dead trees, building timber, under stones and logs, and sometimes in the clayey walls of *Coptotermes*' mounds. It is known from Victoria, New South Wales and South Australia. Eight other species are recorded, from Western Australia, Queensland, and the Northern Territory.

Coptotermes: Small to medium-sized species, very dark-brown or yellowish; head, body, and especially wings, very hairy; 19-jointed antennæ in imago, 16-jointed in soldier, third joint very small. Imago with short, broad labrum, indistinct fontanelle, very short clypeus, without distinct median suture; large eyes and ocelli; pronotum large, a little narrower than head and rather wider than long. stumps of the forewings much larger than, and partly covering, those of the hindwings. Soldier (Fig. 3) With oval, orange-yellow head, black mandibles, long cone-shaped labrum; large fontanelle opening behind the base of the clypeus; long, sabre-shaped mandibles, without teeth or serrations, except near the base of left mandible, where there are a few serrations and a long, thorn-like, blunt tooth, visible only in cleared or dissected specimens.

Easily distinguished from all other genera by the presence of a globule of white, milky secretion from the fontanelle.

Coptotermes sp. (near *aciniaciformis*, Frogg.): Length with wings 13.00, without wings 7.50; uniform yellow in colour, excepting head, which is suffused with brown, and wings, which are whitish, with light-brown anterior veins. Soldier: Total length 5.00, head with mandibles 2.40. From Northern Victoria.

* *Coptotermes sedulus*, Hill: Length with wings 15.00, without wings 8.00, very dark-brown above, somewhat paler below; wings dark fuscous. Soldier: Very similar to that of preceding species, but smaller; length of head with mandibles 2.00.

From Southern Victoria. The large earthy mounds and earth-filled crevices and hollows in trees, commonly found in the Forrester Gully and Genbrook districts, are due to the work of this species. The winged forms leave the colonies in immense numbers on their annual colonising flight, during the day and early evening, about the middle of September. The genus is widely distributed, and contains a large number of closely-allied and very destructive species. The species

under notice has been generally confused with *C. lacteus*, Frogg.

Rhinotermes: Small to medium-sized species, of uniform yellow colour; wings clear and remarkably reticulated with furrows and small veins, the principal veins yellow; eyes and ocelli very large and prominent; fontanelle round, distinct, in line with the ocelli and connected with the clypeus by a distinct furrow; clypeus large, with median suture; head almost hairless; antennæ 20-jointed; pronotum large, and a little narrower than head; stumps of the wings hairy, those of the forewings much larger than those of the hindwings, and reaching the base of the latter. Soldier (Fig. 4): Of two distinct forms; head more or less quadrangular; fontanelle circular, distinct, in line with the insertion of the antennæ, a deep furrow passing forward from the fontanelle through the clypeus to the apex of the very large labrum, the latter covering the greater part of the mandibles; mandibles long and powerful, with two teeth near the apex of the left and one near the apex of the right. Very easily distinguished from other genera by the above characters.

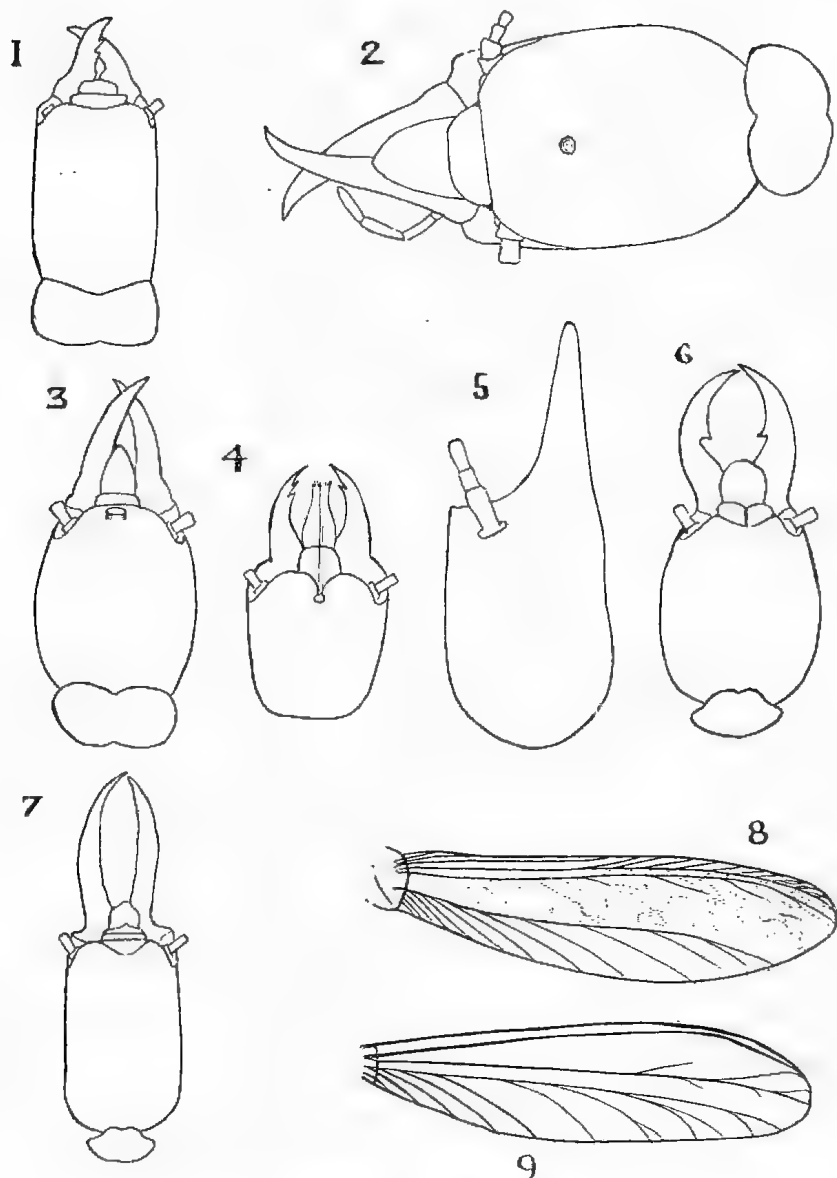
There are two described, and several undescribed, species in Australia, the soldiers of which are very much alike. One unidentified species has been found in North-western Victoria. The genus is widely distributed, and contains very destructive species. Nothing is known of the breeding habits, queens or nests of Australian species. The winged forms leave the parent colony in small numbers, at night, during a period of two or three months.

Euterмес (Figs. 5 and 9): Small to medium-sized species, with medium vein distinctly nearer cubitus than to radius; clypeus large, more than twice as wide as long, and with indistinct median suture; eyes large and prominent, ocelli large; fontanelle elongate, forked anteriorly; antennæ 15-jointed; pronotum large, slightly narrower than head. Soldiers with pyriform head, prolonged anteriorly into a rostrum; mouth parts concealed by rostrum.

Euterмес fumigatus, Branner: Length with wings 13.5, without wings 6.00, dark-brown above, head and wings nearly black, under-surface yellowish-brown. Soldier: Total length 4.50, head to apex of labrum 1.60; head yellow, with orange-rufous rostrum.

This species is found in southern and South-eastern Victoria, generally under logs and stones, in small colonies. The winged forms are present from February to May. Very little is known of its habits, and it is probable that it

PLATE III



VICTORIAN TERMITES.

Heads of Soldiers: (1) Calotermes; (2) Leucotermes; (3) Coptotermes; (4) Rhinotermes; (5) Eutermes; (6) Hamitermes; (7) Microserotermes. Typical Wings: (8) Calotermes (sub-genus Neotermes); (9) Eutermes.

differs specifically from the New South Wales species described by Brauer. There are several very closely-allied species in Australia, most of which are difficult to separate in the soldier caste, but are markedly different in the winged form.

Eutermes exilisus, Hill: Length with wings 25.00-26.50, without wings 6.50; head very dark-brown, nearly black, thorax and abdomen chestnut brown, clypeus and under-surface yellowish, wings light-brown, with yellowish costal margin; eyes and ocelli very large.

This species is found in Western and North-western Victoria, where it builds small, woody termitaria or mounds generally over the remains of a tree-stump or root. There are several closely-allied Australian species with widely-different habits; some of these have been mistakenly identified as *E. jampouensis*, Walker. The species under notice extends in Western Australia.

Hamitermes wilsoni, var. *victoriensis*, Hill: Length with wings probably about 12.00-13.00, without wings 7.00-8.00; head, thorax and abdomen dark-brown, clypeus lighter brown, labrum and legs yellowish, wings probably dark fuscous; antennae 15-jointed; eyes small, but very prominent; ocelli small and not very near eyes; fontanelle oval; clypeus large, a little wider than long, with distinct median suture, but not strongly bilobed; pronotum triangular. Soldier: Total length 5.00, head with mandibles about 1.90; head pale yellow, a little larger than wide; clypeus strongly bilobed; labrum large and covering about one-third of mandibles; mandibles sickle-shaped, with a large tooth on each, about the middle. (Fig. 6.)

An imperfectly-known species, found in small colonies, under stones, near Preston.

Microcerotermes: Very small species, with small eyes and small ocelli; no fontanelle; 14-jointed antennae, and narrow fuscous wings. Soldier (Fig. 7): With long, narrow head, large conical labrum, 13-jointed antennae, long, slender, curved mandibles, finely serrated along entire length of inner margin, but without teeth.

Soldier and workers only of two species have been found in drier districts of Victoria. In these castes they appear to be identical with Northern Territory and South Australian species, descriptions of which have not yet been published. Fourteen species are known from Australia, many of which are very destructive. All are wood-eaters; some build small cone-shaped, woody termitaria.

NOTES ON THE COLEOPTERA OF NORTH-WESTERN VICTORIA.

PART XIII.

By J. C. GOULDIE.

(Read before the Field Naturalists' Club of Victoria,
July 15, 1925.)

CURCULIONIDÆ.

Belus flindersi, Blackb. This species was omitted from the list in a previous paper.

BRENTHIDÆ.

- 5639 *Cordus hospes*, Germ. The only representative we have of this family, which is closely allied to Curculionidæ, differing in the position of the rostrum, which is not turned down, and in having moniliform, non-angulated antennæ. It is about $\frac{1}{2}$ -inch in length, very narrow, of a dark-red colour, and often occurs in ants' nests:

ANTHRIBIDÆ.

5670. *Aræocerus fasciculatus*, De Geer, var. *sambucinus*, Boisd. A small, brownish, mottled beetle, found under bark on dead trees. Another species, as yet unidentified, was obtained from the dried stems of Marsh Mallow, *Lavatera plebeja*, at Green Lake.

CERAMBYCIDÆ.

The Larvæ of Longicorns are wood-borers, tunnelling in the branches, stems and roots of many species of trees and shrubs, often killing them outright. It is a common occurrence to find a sapling, or a long branch, tunnelled throughout its length by a single Longicorn grub. Being very numerous and widely-distributed, these larvæ do great damage to our native timbers, as often they exist for two or three years in the wood. They pupate in a chamber, formed generally at the end of the tunnel, the perfect beetles gnawing their way out in the spring or summer. The oval-shaped exit-holes are characteristic signs that a tree has been attacked by either Longicorn or Buprestid beetles. The larvæ of some species are preyed upon by a small Ichneumon wasp, which, with its long, bristle-like ovipositor, is able to pierce the bark and lay its eggs on or in the body of its victim. From a pupa of *Scolecobrotus variegatus*, Blackb., I once obtained six of these parasitic wasps.

Some of our largest and most formidable-looking beetles belong to this family, as well as many of slender and graceful appearance. They are generally nocturnal in habits, at least so far as the use of their wings is concerned, being found, by day, either clinging to the branches of their food-plant, or hiding under the loose bark of trees.

5680. *Macrotonia servilis*, Pasc.

5691. *Cnemoplites impur*, Newm.

These are two of our largest species, measuring up to 2½ inches in length. They are similar in appearance, being of a dark-reddish-brown colour, and have the outer margins of the sub-quadrate prothorax finely serrated. They breed in Mallee-butts and roots, also in the Black Box, *E. bicolor*. The large, yellowish-white larvæ were considered a *bon bouche* by the blacks, while anglers find them a useful bait.

5718. *Pachydissus sericus*, Newm. A fairly common coastal species, of which I have taken only one example in the Mallee; this specimen measures ¾-inch, which is about half the size of typical specimens. It is dark-brown, with a silky sheen.

5726. *Phacodes obscurus*, Fabr. A brown beetle, about 1 inch in length, with greyish, mottled markings on the elytra. On the disc of the strongly-rounded prothorax are three small but distinct tubercles.

5729. *Æbarina tristis*, Pasc. A small, narrow, brownish insect, with short, slender antennæ.

Phoracantha posticalis, Blackb.

5743. *P. punctata*, Don.

5744. *P. quinaria*, Newm.

5745. *P. recurva*, Newm.

5746. *P. semipunctata*, Fabr.

P. senio, Newm.

5748. *P. tricuspis*, Newm.

The species of *Phoracantha* are, perhaps, more commonly met with than any other of our Longicorns. Under the loose bark of trees, especially those in blossom about midsummer, some of them are found in numbers. They are mostly of a yellowish tint, with dark-brown or black transverse, zig-zag bands on the elytra. The long, slender antennæ are armed with acute spines on many of the joints, and there is a lateral spine on the prothorax. *P. tricuspis*, one of the largest, is about 1½ inches in length. It breeds in the Black Box. The other species also attack this tree, as well as the Mallee; in fact, hardly a tree of any kind escapes them.

5755. *Trypocharia odewahni*, Pasc. This is rare locally, it is $1\frac{1}{4}$ inches in length, dull dark-brown, without markings, rugose and strongly punctured.

5761 *Atesta angasi*, Pasc.

A. tatei, Blackb.

These are similar in appearance; slender, reddish-brown, with an inconspicuous yellow spot near the middle of each elytron. *A. angasi* is $\frac{3}{4}$ -inch in length; *A. tatei*, smaller, and much darker, the yellow spot more obsolete.

5767. *Ooplocercus aberrans*, Newm.

5773. *C. rubripes*, Boisd.

C. aberrans is long and slender, nearly 1 inch in length, pale reddish-yellow, with three irregular dark bands across the elytra. *C. rubripes* is smaller and darker, about one-third of the apex of elytra (except a very small yellow spot at extreme apex) being nearly black. All the femora are much thickened, and red.

5780. *Sisyrium ibidionoides*, Pasc. A small, pale-yellowish species, with head, apex of elytra and two ante-medial spots black, of which I obtained a single specimen.

5799. *Callidiopsis scutellaris*, Fabr. Is uniform dark-reddish-brown, $\frac{1}{2}$ -inch long. The small, but distinct, yellow scutellum helps to identify this species.

Aposites niger, Blackb. A decidedly rare species. It is uniformly dull-black, long and slender, with prominent mandibles and eyes, and is upwards of an inch in length. The antennæ are flattened, each joint, except the two first and last joints, produced at apex to form a short spur or tooth. Taken on the wing at dusk.

5828. *Exxereta unicolor*, Pasc. I have found this beetle breeding in the wood of the Bull-oak, *Casuarina luehmanni*. It is pale-yellow, without markings, and is about $\frac{1}{2}$ -inch in length.

5831. *Bebius filiformis*, Pasc. One of our smallest species, being slightly over $\frac{1}{4}$ -inch in length, very narrow and almost parallel-sided. It is light-reddish-brown in colour.

Scolecobrotus variegatus, Blackb. By many collectors this is regarded as merely a variety of *S. westwoodi*, Hope, one of the most destructive of the "branch-cutting" Longicorns. It is about 1 inch in length, reddish-brown, with a dark blotch on the elytra behind the shoulders. In the males the 12-jointed antennæ are strongly serrated.

Many years ago D. Best gave a very interesting account* of this beetle, and the larva's method of working. He stated that, although the beetle is fairly common, yet it is rarely captured in the ordinary way, but must be reared from the wood. This coincides with my experience.

Uracanthus albatrus, Lea.

U. discicollis, Lea.

U. loranthi, Lea.

5840. *U. strigosus*, Pasc.

5841. *U. triangularis*, Hope.

In his tabulation of the *Uracanthides*† Lea records 28 species of this genus from various parts of Australia and Tasmania. They are long, narrow beetles, generally of some shade of reddish-brown, with pale clothing, taking the form, in some species, of vitta on the prothorax or elytra, or both. *U. triangularis* is readily distinguished by a bare, triangular patch on the elytra behind the shoulders. It is about 1 inch in length. The other (local) species are smaller. They breed in the wood of various Eucalypts, Wattles, etc.; *U. loranthi* in the small branches of the Bull-oak; *U. discicollis*, in the Broom Ti-tree.

5848. *Rhagiomorphia concolor*, W. S. Macl. This purplish-red species, which measures $\frac{3}{4}$ -inch, has two faint, pale vittæ on the elytra, near the suture. The first joint of antennæ long, abruptly thickened at the apex; second joint very short; third nearly as long as first, with a tuft of black hair at apex. It is rare in this district, but common about the Dividing Range, where often it attacks the Blue Gum, *E. globulus*.

5855. *Tritocosmia paradoxa*, Pasc. A very rare species in this district, though it occurs more frequently in Gippsland and in New South Wales. It is black, with the elytra, which are distinctly "ribbed," pale-yellowish-red. The antennæ are thickened at apex of first and third joints.

5869. *Sylletus graminicus*, Newm. A very slender Longicorn, $\frac{1}{2}$ -inch in length, with a dark-red prothorax and head, the elytra brown, with three thin, grey, longitudinal lines on each. I have taken it on the flowers of the Black-thorn or Prickly Box, *Bursaria spinosa*.

5892. *Bimia bicolor*, White. This fine species is seldom seen. It is about 1 inch in length; the antennæ, middle part of head, disc of prothorax, scutellum, hind legs, tibia and tarsi of other legs and under parts of body black,

*Vic. Nat., Vol. XIV, p. 146.

†Trans. Roy. Soc., S.A., XL, 1916, p. 368.

the elytra, which are of a thin, "papery" texture, and the remaining parts being pale orange. It breeds in several species of Mallee, its presence being indicated by roughly circular depressions, about $1\frac{1}{2}$ inches in diameter. The bark having been eaten away, the wood is exposed, and in the centre of the depression will be found a small, plugged-up hole, where the grub has entered the wood. A coloured plate in French's "Destructive Insects of Victoria," Part IV, of *B. femoralis*, illustrates this process, the habits of both species being the same. *B. bicolor* usually appears in September.

5899. *Agapete kreusleri*, Pasc. On a casual inspection this species might be mistaken for one of the Hymenoptera, the short, pointed, pale-coloured elytra leaving the flight-wings, which are not folded when at rest, exposed. It is $\frac{1}{2}$ -inch in length, black, with the head, front of prothorax, and a band across the abdomen reddish-yellow.

5902. *Eurhys mimulus*, Pasc., var. *unifasciata*, Lea. A pretty and scarce Longicorn, taken on Mallee blossom. It is $\frac{1}{2}$ -inch in length, with black head, legs, and antennae, red prothorax, and dark-blue elytra. Marked at about apical third with a transverse yellow band.

5918. *Hesthesis cingulata*, Kirby.

5923. *H. plorator*, Pasc.

These curious beetles seem to have been designed by Nature to pass as Flower-wasps, the short, almost obsolete elytra, long flight-wings, black and white ringed body being well calculated to deceive, especially when the insects are seen on flowering shrubs, as is usual. *Cingulata* is about 1 inch in length: *plorator* much smaller. Both are rare.

5931. *Distichocera par*, Newm. The male of this rare species has flabellated antennae, which are thickened towards the tips. I have taken only one specimen, which measures $\frac{3}{4}$ -inch. It is dark-chocolate-brown, with faint whitish vittae on prothorax and elytra, the latter being narrowed to apex and strongly carinated.

5934. *Eroschema poweri*, Pasc. This species is black, with yellowish-red, ribbed elytra. Several of the basal joints of the antennae are clothed with tufts of black hair. Superficially resembles some of the Malaeodermidæ, in whose company often it is found, on flowers: it is $\frac{1}{2}$ -inch in length.

Brachytia thoracica, V. de Poll. One of our rarest and prettiest species, measuring about $\frac{3}{4}$ -inch. The

head, front of prothorax, femora (except tips) and basal part of elytra are reddish-yellow, remainder of prothorax and legs black. About the middle of elytra is a whitish, transverse band, from which, to the apex, the colour is black, with shades of purple. My single specimen was obtained from a dead branch of the Bull-oak.

5943. *Pempsamacra dispersa*, Newm. A greyish-brown, mottled beetle, with comparatively short antennae. It is $\frac{5}{8}$ -inch in length, and is found, during the day, on flowering shrubs.
5987. *Ischnotes bakewelli*, Pasc. A narrow, dark-brown beetle, about $\frac{3}{4}$ -inch in length; somewhat cylindrical in shape; rare in the Mallee.
6011. *Microtragus mormon*, Pasc. This species is remarkable in that it resembles, both in appearance (except the antennae) and habits, the Amycterides, or ground Weevils. It is about 1 inch in length, rather stoutly built, of a greyish-brown colour: the prothorax rugose, strongly punctured, with a short lateral spine. The elytra have each a prominent tubercle at the base, and two almost tuberculate, curved ridges, not reaching apex. It is apterous, and lives entirely on the ground, on or under logs, in which the larvæ feed. When ready to pupate, the larvæ enter the soil, and form oval cocoons composed of gnawed wood and sand, from which the perfect beetles emerge in February. The species has a wide range, being found also in Western Australia.
6079. *Ancila (Hebecerus) marginicollis*, Boisd. Like many other insects, this used to be common on the wattle scrub, but with the clearing of hundreds of square miles of Mallee is now seldom seen. It is under $\frac{1}{2}$ -inch in length, mottled and speckled grey and brown, and has the outer margins of prothorax yellow.
6128. *Symphyletes lateralis*, Pasc.
6135. *S. pubiventris*, Pasc.
6146. *S. vestigialis*, Pasc.

These handsome beetles have a decided preference for the acacias, the larvæ boring in the branches, and the beetles subsisting on the bark. *S. lateralis*, which is (or was) fairly common, is about $\frac{5}{8}$ -inch in length, light-reddish-brown, with a paler, irregular stripe on the suture, and a silvery stripe on outer margin of elytra. *S. pubiventris* is larger; the general colour grey, freckled with small black spots, and marked on the elytra with ten white spots, two

being on suture. A rare species. *S. vestigiatus*, about the same size, has the prothorax marked with alternate rings of black and white; the elytra are thickly speckled with black spots, and have a narrow, silvery stripe, on outer margin. It breeds in the Umbrella Acacia, *A. oswaldi*, cutting perfect rings in the bark round the smaller branches, so that the portion above soon dies.

6151. *Platymopsis armatula*, White. Fresh specimens of this are very attractive in appearance, being of a creamy-grey colour, with dark, oblique markings in the form of an X on basal half of elytra; there is a transverse band at about apical third, and a large black spot near the middle of outer margins of elytra, which are also studded with scattered clumps of small black spines or tubercles. It breeds in the smaller branches of the Black Box, *Eucalyptus bicolor*, a tree more commonly known as the "Swamp-box." The beetle measures $\frac{3}{4}$ -inch in length.

6161. *Penthea picta*, Pasc. This species is of rare occurrence; the single specimen in my collection was taken on a Salt-bush plain at Ballapur. It is $\frac{3}{4}$ -inch in length, the general colour greyish-brown, the antennae rather short. Front of prothorax marked with a whitish ring. The elytra are mottled and blotched with dark-brown, and have two silvery-white, transverse markings (reaching outer margins but not suture), and another of the same colour on the base.

6176. *Rhytiphora latifasciata*, Pasc.? I have a specimen which may be this species, but as it is in poor condition, having been found dead and broken, in its tunnel in a branch of the Black Box, a doubt must be recorded. The insect is chocolate-brown, with a wide, pale, transverse band extending from behind shoulders to about apical third of elytra. It is about an inch in length.

6198. *Corrhene pautla*, Germ. This species breeds in the wattles, such as *Acacia haakeoides*. It is $\frac{3}{4}$ -inch in length, fawn-coloured, with dull, white markings on the prothorax and elytra. Some specimens have a distinct dark oblique mark at about apical third of elytra.

In addition to the above there is a species of *Bethelium*, which breeds in the Murray Pine, *Callitris verrucosa*; one of *Uracanthus*; one of *Phoracantha*, and one of *Didymocantha*, which have not been identified.

I am indebted to Mr. Chas. Oke for the names of some species in this list, and for other assistance generously given.

ANTS AND THEIR GUESTS.

BY H. W. DAVEY, F.R.S.

The study of Myrmecophiles, or Ant-guests, is fascinating. The field is wide, and we have tilled only a small corner of it yet, in Australia.

When one examines an ants' nest for the first time, in quest of "guests," it is to experience surprise that so many little creatures dwell among ants. Some are persecuted, others tolerated, or welcome, boarders. Probably, in many instances, acarids will be most in evidence, when a nest is opened or uncovered. It is, perhaps, the presence of these mites, in large numbers, that makes beetles, such as *Nephuris* of the Colydiidae, and *Polylobus*, *Dobra*, and others of the Staphylinidae, welcome guests.

When I was working out the symbiotic relationship existing between the Lycaenid butterfly, *Miletus ignita*, and the ant, *Iridomyrmex nitidus*, it was necessary to keep colonies of the ants in captivity. Proof was obtained that the ants could not, or would not, free themselves from the attacks of mites. In the course of a few weeks some ants had so many mites fastened to their legs and body segments as almost to prevent them from walking. Yet they made no attempt whatever to dislodge the pests; nor were there any signs of mutual aid. The explanation may be that the ants, in natural conditions, depend upon inclines to remove the parasites.

The association of *Miletus ignita* and *Iridomyrmex nitidus* affords an excellent example of Symbiosis. The caterpillars of this butterfly feed at night, on the leaves of the Golden Wattle, *Acacia pycnantha*, and are accompanied by ants, which return with them later, to the nest, where the caterpillars remain during the daytime, clustered together in one of the lower galleries. The symbiotic relationship is as follows: The caterpillar is sheltered in the ants' nest during the larval and pupal stages (emerging direct from the nest, in due time, as a butterfly), and protected at night, when feeding, from attacks by predatory insects. In payment for this service, the ants enjoy meals of "honeydew," excreted from the anal segment of the caterpillar. But in this, too, the ants are serving their guest, for if the excreted liquid were not removed from it the caterpillar's body would become fouled, and would be attacked by entomogenous fungi, resulting in death.

In the nests of some species of ants *Collembola*, or Spring-tails, *Lepura* species, for example, are found. The *Thysanura*, of the same order, Aptera, are often represented by a species of *Lepisma*. These insects are unable to jump, but they are swift-footed. These insects, and the blind beetles, *Rodwayias*, of the family *Trichopterygidae*, appear to be welcome guests, and may benefit the ants by keeping down the growths of moulds and other fungi in the nest.

The *Pselaphidae* and *Staphylinidae* are, undoubtedly, welcome guests, and probably the *Seydmenidae* are, too. Beetles of the first two families may supply excretory matter, upon which the ants feed, but are possibly most useful in keeping down mites, etc. The species of *Chlanydopsis* are most certainly hostile, although their epaulits have the appearance of excretory organs. If they are not hostile, it is difficult to understand the need for protection; they are able to tuck away tarsi and legs completely, also the head and antennae. In addition, species are wonderfully protected by mimicry, both in shape and colour. *Chlanydopsis granulata*, Lea, when frightened and "closed up," bears a strong resemblance to the large head of a *Pheidole* soldier ant of the species, in a nest of which it lives.

Beetles of the families *Ptinidae* and *Dermestidae* probably are scavengers. Species of *Ptinidae* are, occasionally, plentiful in many nests; the family *Dermestidae* often is represented by larvæ only. Large nests, especially those having old-established ant-cemeteries or dumps, are frequented by these insects.

Among myrmecophilous insects may be mentioned the curious beetle *Cordus hospes*, which occasionally is so numerous as to form patches of colour in the nest. It is difficult to determine whether these *Brentids* are friends or foes; probably they are welcome guests. Beetles belonging to the family *Tenebrionidae* may be found occasionally in ants' nests: the *Scarabæidae* frequently are represented by species of *Cryptodus*, the larvæ of which probably feed on the vegetable matter in ants' nests.

The order *Hymenoptera* is represented by tiny Chalcid wasps; there need be little doubt as to their intentions. Orthopterous insects often are to be seen running through a nest, the commonest being a small, stoutly-built, but pallid, cricket, and some small *Blattidae*. The latter may be welcome: for bees allow a small species of cockroach to wander through their hives unmolested.

Diptera may be present in the shape of larvæ of one of the *Syrphid* flies of the *Microdantinae*. *Walhalla* appears to be

much favoured by these extraordinary larvæ, as on several occasions I have found them in nests of the small black ant so common in that locality. They are so unlike the larvæ of any order of insects that, when first discovered, they were supposed to be small molluscs, and were actually described as such, under the generic names *Parmula* and *Scutelligera*. I reared a series of *Microdon* larvæ and pupæ, found at Ararat, and the flies later were described by the Bureau of Entomology, Washington, D.C., being named *Microdon Daveyi*.

Curious little creatures of the class Arachnida, of the order Phalangidea, I have taken from the nests of the large Bull-dog Ant, *Myrmecia forficata*. These Harvestmen may have been present accidentally, but as they have been found on three or four occasions, in nests of this ant, it appears likely that they visit the nests in search of acarids, etc. Their stink-glands would protect them from attack by the ants.

Of the many peculiar acarians inhabiting ants' nests probably *Plocharus Daveyi*, Silvestri, is one of the most aberrant, owing to the very unusual length of the first pair of legs.

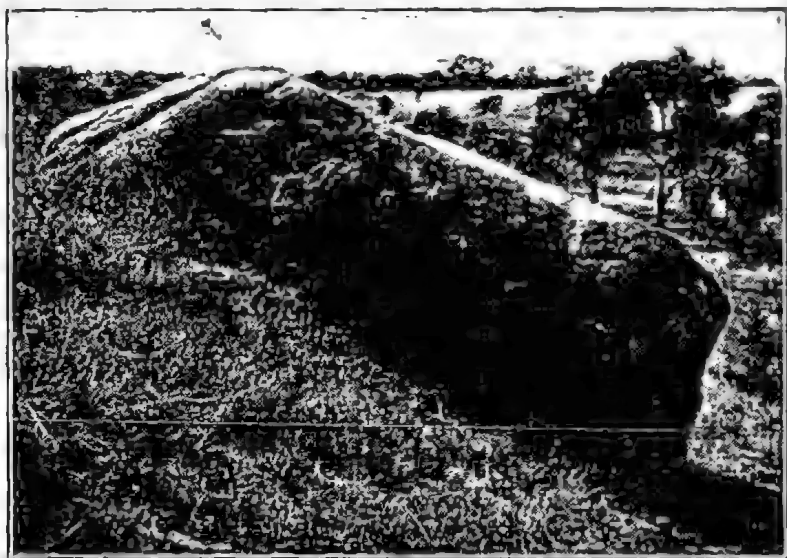
It is not surprising to find members of the Coccidae in ant-nests, as with many insects belonging to this family, ants have a symbiotic relationship.

"THE STRANGER" ROCK, DERRINAL.

Thirty-three years ago the late Dr. T. S. Hall read before our Club a short paper on "The Glacial Beds Near Heathcote" (*Victorian Naturalist*, viii, p. 172), and in it referred to the "Special Report on the Glacial Conglomerate of Wild Duck Creek," by Mr. E. J. Dunn, F.G.S., of the Mines Department, Victoria, and the rock at Derrinal, known as "The Stranger." On Easter Monday last Mr. and Mrs. V. Miller, Mr. J. H. Harvey, and I visited Derrinal, travelling by rail to Heathcote.

The Heathcote district possesses many geological features of great interest, which have been discussed in various publications from time to time. Derrinal is five miles away. "The Stranger" is a stranded rock, about a mile and a half from the station. We started off along the railway line (in the direction of Bendigo). Soon after crossing the Mount Ida Creek, we saw evidences of glacial action in a small cutting, through which the railway passed, striated

pebbles and pieces of rock embedded in the glacial hill. A little further ahead, on our left, was seen a large, flat stone on the slope of a hill, which proved to be "The Stranger." It is a tabular mass of coarse-grained granite, about 16 ft. 6 in. by 10 ft. 6 in., and 5 ft. thick; estimated weight, about 30 tons. The remarkable feature of the rock is the smoothness of its present upper surface, which is attributed to the fact that it was planed by ice action many thousands of years ago. Round about are several other fair-sized stones, evidently of the same origin, and hence known as "Erratics." Quite underneath the stone grow plants of the little Neck-



"The Stranger" Rock.

lace Fern, *Asplenium flabellifolium*, apparently in such a position as to receive no moisture, except from a very driving south-west rain.

Ascending to the summit of the hill we reached a plateau, which had at one time been cultivated. Here we found numerous specimens of striated pebbles, and pieces of rock, but the most of them were too heavy to carry far, previous visitors having probably selected the more portable specimens. "Dunn's Rock," a striated surface of Ordovician, lies about two miles away, to the west. It was named by Sir Baldwin Spencer, after Mr. E. J. Dunn. Some members of our party reached the ruins of a sandstone house of fair

dimensions, on the crest of a hill overlooking the Wild Duck Creek valley. This had once been the homestead of Moorabee Station, held in 1853 by Mr. J. H. Patterson (see "Letters from Victorian Pioneers," page 16). The sandstone of the house was obtained from a cliff on the Wild Duck Creek, not far away. This vantage point, about 1000 ft. above sea level, affords a fine view of the surrounding country: Mt. Alexander, near Castlemaine, the Green Hill, near Kyneton, and the western end of the Macedon range. The illustration of "The Stranger" gives its appearance, as seen from the south-west.—F. G. A. BARNARD.

NATIONAL MUSEUM NOTES.

NAUTILUS FROM VICTORIAN WATERS.

The unusual occurrence of two species of *Nautilus* on the Victorian coast is interesting.

In January, 1920, two very badly-broken shells were found by Miss G. Nethercote, on the ocean beach, on the isthmus connecting Wilson's Promontory with the mainland. One of these, now in the possession of Mr. C. J. Gabriel, proves to be *Nautilus macromphalus*. In May last another specimen (*N. pompilius*) was found on the three-mile beach, on the eastern coast of the Promontory, by Mr. W. H. Ferguson, and given by him to the National Museum. The shell, though unbroken, was much abraded and quite devoid of the usual colour markings.

Mr. Gabriel informs me that he received a description of a shell picked up, a few years ago, near the Nobbies, off Phillip Island. From the description, this, in his opinion, was undoubtedly a species of *Nautilus*. So far as I am aware, this animal has not been found in a living state on the eastern coast, further south than North Queensland. One species (*N. pompilius*) is recorded from West Australia.

The question arises as to the occurrence of these shells so far south on our coast. From personal observations, during the last 15 years, material thrown overboard from the eastern coastal boats, and those from Tasmania, after passing the southern end of Wilson's Promontory, is washed up on the beaches from Oberon Bay to some miles north of Darby River. Frequently great quantities of fruit, such as bananas,

oranges, etc., among other objects, are washed up on the beaches, showing that the trend of the current is in this direction. During the recent war I, personally, found, along these western beaches, a number of bottles, containing notes from departing soldiers.

The inference, therefore, is that these discarded shells, which, as shown by experiments, would float in deep water for a considerable time, have been thrown overboard from some vessel—presumably from the northern states—and have drifted to the localities stated.

JAS. A. KERSHAW, Curator.

EVICTIIONS IN BIRDLAND.

In a secluded gully near the Olinda reservoir, Mooroolbark, a male Owlet Nightjar, *Egotheles novae-hollandiae*, had its home, in a hollow limb of a small, dead tree. For more than two years it was flushed, at intervals; but one day there was no response to my knocking on the tree. Looking into the hollow, I saw two eggs of the White-throated Tree-creeper, *Ulimacteris scandens*. They were partly covered with opossum fur, but were cold. The Tree-creepers were not seen. A week later the eggs were still there, completely covered in fur, and pieces of charcoal from the inner wall of the hollow. There was evidence that another bird had been camping there, as the material covering the eggs was well pressed down. It now appeared obvious that, during the absence of the Owlet Nightjar, a pair of White-throated Tree-creepers selected the hollow for their nest, but after the eggs had been deposited the former occupant reappeared and forced the intruders to seek a new "home." A few weeks later the Owlet Nightjar again took possession of its old home, and remained there for several months, until the tree was destroyed by fire. Mr. A. J. Campbell records a similar instance of an Owlet Nightjar taking possession of a hollow after a pair of Tree-creepers had laid their eggs in it. These records indicate that the Owlet Nightjar is often the enemy of small birds who rear their brood in hollow boughs.—D. DICKISON.

Mr. C. Oke's name should have been included in the list of authors of papers given in the Annual report published in July, 1925, *Naturalist*. In his paper, "New Australian Coleoptera," May issue, p. 14, line 5, should read "six segments in F. and seven in M."

The Victorian Naturalist

VOL. XLII.—No. 5. SEPTEMBER 11, 1925. No. 501.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, August 10, 1925. The President, Mr. Geo. Coghill, occupied the chair, and about 45 members and friends were present.

CORRESPONDENCE AND REPORTS.

A birch-bark post-card was received from Miss R. S. Chisholm, Canada, who sent greetings to fellow-members. Mr. F. Pitcher read a report of the excursion to Mount Morton, and the President spoke of the outing to Mitcham.

ELECTION.

On a ballot being taken Miss G. Simpson, 42 Glendearg Grove, Malvern, was elected as an ordinary member of the Club.

PAPER.

"Habits of the Sand-Wasp," by L. G. Chandler. The author described the habits of a common wasp that burrows in the sand, and paralyses "cut-worm" caterpillars, as food for its larvæ. Messrs. Coghill, C. Barrett, C. French, junr., and C. Oke discussed the paper.

PRESENTATION TO MR. BARNARD.

The meeting adjourned to the lower hall, where refreshments were provided, and a presentation was made to Mr. F. G. A. Barnard, in recognition of his highly-valued services to the Club during nearly 40 years.

The President said that members had gathered to do honour to a fellow-member, who was a "Father of the Club." He had served it in various offices, and for 32 years as Hon. Editor of the *Naturalist*.

Mr. F. Pitcher, an original member, spoke of Mr. Barnard's splendid work for the Club; of his readiness always

to give advice and help to others; and his unrivalled knowledge of Club history, etc.

Mr. C. Daley read extracts from several letters selected from a number received, all written in appreciation of Mr. Barnard's services. Mr. Daley then, on behalf of the subscribers, presented a wallet of notes to Mr. Barnard.

Mr. Barnard, in returning thanks, said that the Club had been his hobby. It had been a pleasure to serve it. He related some incidents in the Club's early history.

Mrs. Barnard also spoke.

EXHIBITS.

By Mr. F. Chapman, A.L.S.—A Miocene Coral, *Orbicella tasmaniensis*, Duncan, sp., from Flinders, Vic. A first record (by Rev. Geo. Cox) from this locality; also Green Flowering Gum, *Eucalyptus Lehmannii*, grown at Balwyn.

By Mr. C. French, Jun.—Five specimens of a remarkable Coccid (scale insect), *Apiomorpha munita*, male and female, collected in the Dandenong Ranges, 18/7/25.

By Mr. E. R. Hammet—Seed-pod of Cassia, grown Kilkevan, Queensland.

By Mr. V. Miller—Fungi from Sherbrooke Gully, Belgrave, Vic.

By Mr. F. Pitcher—Distinctive pink and white form of the Native Heath, *Epacris impressa*, collected during Mt. Morton excursion, 18/7/25.

By Mr. A. L. Scott—Quartz crystal from garden in Caulfield, the imperfectly-formed faces being worthy of notice.

By Mr. H. B. Williamson, F.L.S.—Wild-flowers from Foster, including white specimens of *Sprengelia incarnata*, F.v.M., the Pink Swamp Heath, collected by Mr. F. Barton, Jun.; also specimens of *Pultenaea styphelioides*, F.v.M., and species recently described; *Pultenaea subternata*, H.B.W., N.S.W.; *P. trichophylla*, H.B.W., S.A.; and *P. pubescens*, H.B.W., S.A., and Vic.

By Mr. E. E. Pescott, F.L.S.—Herbarium specimens of the Western form of the Banded Greenhood, *Pterostylis villosa*, F.v.M., from W.A.; flowering specimens of the Grampians Heath Myrtle, *Thryptomene Mitchelliana*, F.v.M. (cultivated); various specimens of aboriginal stone axes, some grooved for hafting, from the Southern Coast of Victoria (recent collections).

HABITS OF THE SAND-WASP.

By L. G. CHANDLER.

(Communicated by C. Barrett)

(Read before the Field Naturalists' Club of Victoria, August 10, 1925)

North-west Victoria is particularly rich in wasps and other insects of the order Hymenoptera. The genial climate of this sunny corner of the State is, no doubt, the main cause of their presence in such numbers and variety. Wasps, though fascinating insects, have had little attention paid to them in Australia.

With the object of interesting especially the younger members of the Club, I shall describe the habits of the wasp, *Ammophila suspiciosa*. My notes, by no means complete, for they have been gathered in moments stolen from pressing work, may serve as an introduction to the study of the species. *Ammophila* means "lover of the sand." It is a title euphonious and well applied; though perhaps almost any species of wasp that burrows in this region could, with justice, bear the same name.

The Sand-Wasp, like most wasps that dig a perpendicular burrow, prefers a firm soil in which to begin its excavating, and the beaten paths used by man, and the head-lands in a vineyard, are much favoured by it. The loose, sandy soil of the vineyard itself, is one of its favourite hunting grounds. And as its prey is invariably a caterpillar of the Bogong Moth, *Agrotis spina*, or allied species, known to the man on the land as "cutworms," it is obvious that the wasp is of economic importance. About September, when the vines are beginning to shoot the cut-worm pest, especially in a newly-planted vineyard, frequently assumes serious proportions; and were it not for the effective check kept upon these caterpillars by certain species of birds and insects, the lot of the grower would be unbearable. The same applies, but with even greater force, to the wheat-grower, for, unlike the horticulturist, he cannot protect himself by the application of poison-baits and sprays.

The "balance of Nature" is very wonderful, and almost simultaneously with the appearance of the cut-worm cater-

pillars *Anmophila* leaves her winter's prison in the ground as a perfect insect. Perfect, that is, in all but wing-development; and very soon the tiny, double wings become expanded to their full size. Love-making over, the wasp, between visits to flowers in search of nectar, applies herself to the capture and paralysis of cut-worms, and the perpetuation of her race. Should the day be cold and cloudy, her activities as a huntress are temporarily checked, for, like butterflies, wasps are lovers of sunlight. At night they take shelter in post-holes and hollow trees, and, on cold mornings, remain concealed until the sun tempts them forth.

The cut-worm larva is a night-feeder, and before daylight it burrows into the soil, perhaps a quarter or half an inch below the surface. In a vineyard the horticulturist can often note its presence by the disturbed condition of the soil; but the wasp apparently finds it by some other method, in which her antennæ play an important part.

When hunting, the course of the wasp, to an onlooker, appears to be very erratic. In her wanderings often she goes over the same area again and again. With antennæ tapping the ground, she pauses, burrows, moves on, burrows again; and so the hunt continues—sometimes fruitlessly if the game be scarce—for half an hour or more. It seems fairly certain that where she burrows a cut-worm has been concealed, or is then in hiding, but probably at too great a depth for her to make a successful capture. So far, I have failed to find a cut-worm at such places, but with other species of wasps, particularly a small member of the genus *Pompilius*, a spider huntress, I have had sufficient proof to convince me that the wasp has a sure method of locating her hidden prey. It is probable that the insect is endowed with a sense of which we have no knowledge. Those delicate, waving antennæ surely hold the secret that baffles my understanding!

The presence of her prey can hardly be detected by the wasp by sound, unless her organs of hearing are extremely delicate, for the cut-worm lies perfectly still. On the other hand, it is doubtful whether scent is the determining factor. Time and again, I have placed a cut-worm in the path of a wasp intent on hunting, and she has passed within a few inches, or walked right across it. On the surface of the soil, and quiescent, the caterpillar was merely an obstruction in her path. Had it moved she might have recognised it as her usual game. If smell were the deciding sense, she would have immediately seized and paralysed the cut-worm when

walking across its body. That she did not recognise her prey by sight alone is not strange. The sight of a wasp for *still* objects is not particularly good, and, moreover, her instinct tells her to seek for the cut-worm beneath the soil. The soil in conjunction with the antennae acts as a medium whereby the presence of her quarry is transmitted to the wasp's brain, but in what way I do not know.

Ammophila suspiciosa is a solitary species. Provided that the soil is firm enough to burrow into, her wants for the site of the home for her grub are satisfied. She first captures and paralyzes her game, and then, within a few yards, excavates a perpendicular burrow about an inch and a half in depth. Branching off at the bottom is a cell just large enough to accommodate the caterpillar. The varying methods adopted by individual members of the species from the time when the caterpillar is captured until the burrow is finally closed are somewhat remarkable. When I first observed these variations, I thought, maybe, I had met with two distinct species, but a close examination revealed the wasps to be identical.

In this variation of habits, there is one outstanding feature. In one case the wasp, after she has paralyzed her prey, places it off the ground, on vegetation, while she constructs the burrow for its reception; in the other case, she buries it temporarily by raking sand over it with her forefeet. I have had no evidence as yet to show that the one individual is capable of adopting either method according to her fancy, and, unfortunately, I have not had the necessary time to devote to continuous observation and experiment, whereby this point might be settled. It is certainly full of delightful possibilities, as it would go a long way towards proving whether the wasp is bound rigidly in her actions by instinct, or whether she is guided to a limited extent by reason.

Quoting from my note-book, I will deal, first, with the case of a wasp that temporarily buries its prey:—

8/11/24.—“About 4.30 p.m. I noticed cut-worm wasp digging a burrow. She was bringing up pellets of earth supported between her mandibles and front legs, and as she reached the top of the burrow, walking backwards, she would throw the earth behind her with a quick action, and immediately go below again. As the burrow neared completion, it took her from four to seven seconds per trip. Several times she left her task, and took aimless walks around the neighbourhood pausing occasionally to sun and groom

herself. On returning to the burrow she exhibited signs of nervousness, and seemed afraid to go below. I was puzzled by these actions until I observed a small, brown ant near the entrance to the burrow. The wasp was very scared of the tiny ant, and jumped into the air when she saw it at close quarters. The same thing happened when she blundered across a line of ants in her wandering. Finally, she came back to the burrow, made several attempts to go below, hesitated, descended about half the length of her own body, and backed out and resumed her wandering. I was surprised when she stopped at a small heap of sand an inch from the burrow, and, after scratching, a paralysed cut-worm lay revealed. This was my first glimpse of this procedure, for previous wasps that I had studied had placed their game on vegetation.

"Seizing the cut-worm by the body near the head, and clasping it belly to belly with the aid of her front legs, she carried it to a distance of about four yards. Placing it on the ground, she again raked sand over it with her fore-feet, and after more wandering she returned and began a burrow two inches away. I accidentally disturbed her, and she began on another. After ten minutes' work she abandoned this also, as apparently not to her liking—perhaps a root had interfered with her work—and resumed her wandering. A fussy, particular wasp, this! In a few more minutes she picked another spot, two feet from caterpillar, and energetically set to work. The mandibles and fore-feet are used in conjunction, the feet—unlike a dog, that scratches the earth back one foot at the time—being operated together.

"As she bit at the earth she hummed, but the humming ceased as she backed with her load or swept it away with her feet. Three times during the excavation which occupied half an hour, she carefully groomed the moist sand from her face, body, legs and antennæ. In her endeavour to clean her hind-legs she frequently overbalanced and fell on her back, owing to her legs becoming temporarily entangled. Her middle pair of legs are cleaned independently by the front pair; likewise the face and antennæ. Balancing on the front pair of legs, and one middle—usually the right middle—the hind pair of legs, together, would be rubbed up and down on the free middle leg, and to gain additional balance the wasp often put its head on the ground. It was while engaged in cleaning this back pair of legs that the interlocking of the joints happened, and caused the upsetting of her equilibrium.

"During these grooming operations she wandered within

a radius of several feet from the burrow, and at times scratched more sand over her capture. The moist sand adhering to her annoyed her like water sometimes annoys a dog. As the dog rubs itself on the grass to remove the water, so the wasp rubbed herself against the dry, surface sand, with the object of removing the moist sand. When sunning herself, she kept her body flat on the ground, and the middle pair of legs, and frequently all the legs were held at an angle above the body.

"At twenty minutes from the time of beginning the burrow, she gave herself the second complete cleaning; and, after a brief wander, came to the caterpillar, partly uncovered it as though to assure herself that it was still there, and then covered it again with sand. Returning to the burrow, she brought a few more loads of earth from below. All the earth was deposited on the one side, and, unlike many members of her species, she did not trouble to rake the pile backward to clear a space for further deposits. Consequently, as she descended, she occasionally took as much down as she brought to the top. However the job was eventually completed to her satisfaction, and, after another grooming she spread her legs at an angle above her body, and, except for a continual movement of the abdomen in and out, lay motionless, resting and enjoying the sun.

"Suddenly she went to the gut-worm, deftly uncovered it, and, seizing it in the same position as before, she transported it to the burrow. A little manoeuvring to place the head in position over the burrow, and she squeezed past and descended, head first, to the bottom. In a few seconds she ascended, for the first time, head first, and, grasping the paralysed creature by the head, pulled it below. A minute passed, and she had arranged the provender in the desired position, laid an egg upon it, and ascended to the surface. A small quantity of earth was swept backward into the hole, and she descended to push it into position with her head. This procedure continued until the burrow was almost full when she selected small pebbles and bits of chips, and placed them, one by one, into the hole, raking further loose earth, between the trips, with the larger fragments. Several times, while holding a small chip in her mandibles, she pressed the soil into position, often picking up the same piece or using another bit that happened to be closer. A final sweeping of about two inches from all sides of the burrow, and the job was finished. All traces of the burrow had disappeared, and the wasp, retiring a few feet, again completed her toilet before flying away."

The most interesting fact about this observation is, that the wasp is, in reality, an implement-user.

The Peckhams, in their admirable work on American wasps ("Wasps, Social and Solitary"), describe how *Ammono-philæ urnaria* uses a stone to pound down earth over her nest-burrow: "She improvised a tool and made intelligent use of it."

There is a considerable difference in the methods of wasps at work. Some are particularly fussy about their toilet, and often excavate several burrows before they are satisfied with the conditions. Their dread of ants, which frequently raid their game at the unguarded moment when it is lying exposed, is often responsible for this, and some resent the intrusion of a human being. The ants, once they have a good grip on the leg of a wasp, are hard to dislodge, and the wasp has probably had experience on this point. Other specimens I have noted are very thorough in their work, taking care to sweep the soil well back from the burrow, so that there is ample room for fresh deposits. Of their toilet they take little heed; the work in hand is all-absorbing for the moment; and all their movements are methodical and thorough.

It seems strange, on first thought, that wasps should be so particular in the choice of their game. Nearly every order of insects, and also spiders, appears to have its own special wasp enemy. If there is any variation at all as regards the kind of insect captured, it will be found, in most cases, to be a species closely allied to that generally favoured. The reason for this is apparent, when we consider the hunting methods of the wasp, and particularly her manner of paralyzing her prey.

Describing the nervous system of an insect in his book, "Insects: Their Life Histories and Habits," my friend, Harold Bastin, says:—"Beneath the digestive canal (not above it, as in the case of vertebrate animals) passes the central nervous chain of the insect. This is composed of twin cords which connect a series of paired knobs called ganglia. Roughly speaking, each pair of ganglia may be likened to a minor brain, which governs the activities of the parts that immediately surround it. This arrangement accounts for the curious disconnectedness of action, which is observable in a maimed insect." By her marvellous instinct the wasp has a full knowledge of the vital nerve-centres of her game, but apparently only within the limited range of a genus, wherein the nervous system is more or less identical

This explains why her choice in selection is limited to certain species.

In some insects, owing to the grouping of the ganglia being close together, one stab is sufficient to cause paralysis. The slayer of such an insect, if faced with the problem of reducing a cut-worm to a stage of helplessness, where the prey has to be stung in several nerve-centres in succession, would have no knowledge of how to proceed. Her art in the use of the sting, so perfect and uncanny in its application, is highly specialised, and therefore limited in scope. But let me proceed with the method of the *Ammophila*, and the variations that accompany that method.

The actual paralysis of the victim is produced in two distinct operations. But first there is the digging out of the cut-worm. Having located its position, the wasp sets to work, in frenzied haste, biting and pulling at the soil and roots of grass, etc., that obstruct, and throwing the soil behind her in a shower. First on one side, then on the other, she digs, without pause, until the cut-worm lies exposed. Then, without a moment's hesitation, she seizes the writhing creature near the head, and, curving her abdomen, plunges the sting between the first and second pair of legs. Now, withdrawing her sting, and bending her body a little more, she attacks the first segment near the base of the mouth. The cut-worm is now at her mercy. It can still wriggle the hind portion of its body, but it cannot move from the spot. The wasp, as though realising this, leaves it for a while, and arranges her toilet. In the struggle, and hasty digging, she has numerous grains of sand adhering to her; and, as described earlier, she has certain ways of removing the annoyance.

Fabre, who has explained the habits of French wasps so lucidly, considers that the rolling about of the *Ammophila*, after the close of the first act in the paralysis of her victim, is, in effect, "a manifestation of delight" in the conquest. I cannot agree with this, for I have seen the same manoeuvre when the wasp was merely engaged in cleaning herself. As stated previously, it is simply an interlocking of the joints of her hind and middle legs, and this upsets her balance. Her toilet completed, she again mounts the cut-worm and stings it between the second and third pair of legs; moving a little, she takes a fresh grip with her mandibles, and stings it in the next segment. Still another movement backward, and the sting is inserted between the first and second pair of pro-legs. Sometimes only four nerve-centres are attacked, never more than five, according to my observations. As to

the exact points attacked, I find that I have the above positions stated in three places in my note-book, but on account of the sting being thrust underneath the caterpillar it is difficult to determine the exact spot where it enters.

The paralysis complete, the wasp gently squeezes with her mandibles near the head of the game, sometimes from above, sometimes laterally. This action causes sickness in the cut-worm, and for several minutes the wasp eagerly laps up the juices with her tongue. I have observed a wasp, on returning to the leaf where she had placed her game, and, finding it not quite paralysed to her fancy, again sting it in a few places. One wasp began at the anterior end, but, seeming to realise her mistake, she turned around, and attacked it in the orthodox manner.

That some wasps are less skilful than others is evident. I have kept numerous paralysed caterpillars to determine the period of hatching of wasps' eggs, the method of feeding of young wasp, etc. In one case the stung creature partly revived, and, turning completely over, detached and damaged the egg. In another instance the young wasp hatched, and began its meal; but it was obvious that the provender was dead. In two days the young wasp was also dead, poisoned by the decomposing food. This is the only note I have where the wasp had made such a fatal mistake. I did not observe the stinging in this case, so that I am unable to account for the blunder.

In order to determine whether the wasp is capable of reasoning, I have conducted certain experiments. A record of these, and an account of the development of the wasp-grub to the adult stage, etc., may be given in a future article. My thanks are due to Mr. F. E. Wilson for identifying specimens of wasps that I have forwarded to him.

EXCURSION TO MOUNT MORTON, BELGRAVE.

Four members took part in the excursion to Mount Morton, on 18th August. We followed the pathway from the east end of Belgrave station, by which the road journey to South Belgrave is shortened to the extent of about a mile. This pathway passes the recreation reserve, and leads on to the recently deviated Country Roads Board road to the bridge over

the Monbulk Creek, about half a mile below the Monbulk Reservoir. Crossing the bridge, we made a short cut up the hill through Lockwood Estate, to a creek, and ascended the hill which leads up to Mount Morton. On this hill-slope, to the north, is one of the finest heath grounds among these easily accessible from the city. In June and July the white, pink, and deep crimson native heaths, and their various shades, are to be seen in profusion. One form, in which pink and white flowers appear united, has been very pronounced, although not abundant, each time I have visited the hill. This area, about three miles by road from Belgrave has hitherto been preserved from destruction, but now that a motor-car track, branching off from the main road to Narre Warren, has been formed to Mount Morton, it may become less attractive to heath lovers.

Walking through the heath, in a westerly direction for nearly half a mile, we came to the cone-shaped peak of Mount Morton, which, with the exception of a few small Black Wattle and Blackwood trees, and "Mannka" shrubs, *Leptospermum scoparium*, scattered about, and grass and bracken, is bare of vegetation. The mount, computed to be between 800 feet and 900 feet in height, was, until recently, owned privately, but the Ferntree Gully Shire Council wisely purchased an area of four acres, including the mount, and reserved it for public use. The view from the summit is extensive, embracing French and Philip Islands and Western Port Bay, the Strezlecki Ranges, the Baw Baws, portions of Warburton Ranges, Dandenong Forests, Macedon, Melbourne, Port Phillip Bay, the Yon Yongs, the Heads and Mornington Peninsula, with all the intervening areas.

Nothing unusual in the mountain and valley vegetation was noted, and very few flowers were seen, excepting the heath. Some healthy young plants of the Myrtle Acacia, *A. myrtifolia*, were observed in full bloom and bud. The predominating acacias in the district traversed, in addition to the Silver Wattles in the valleys, are the Leper and Hop Acacias, *A. leprosa* and *A. stricta*, and Prickly Moses, *A. verticillata*. Instead of returning by the new road, we took the old one, from Monbulk Creek, and for nearly a mile of the journey were serenaded by Bell-birds, *Manorhina melanophrys*, whose haunts are in the vicinity of the reservoir which we passed. Their musical notes were delightful.

MOSSES OF WILSON'S PROMONTORY.

By J. R. LESLIE.

I had originally intended to present this paper on Mosses, collected during January, 1925, in the National Park, Wilson's Promontory, some time in February, but in attempting to work up the species found the task of identification much more difficult than I had expected. Very little is known of Victorian Mosses, and what has been recorded is dispersed through various journals and fragmentary publications, which often are difficult of access. In the determination of the following species, I have made considerable use of Rodway's excellent "Mosses and Hepatics of Tasmania," as being the most reliable guide having any close connection with the Victorian forms. I have also referred to Braithwaite's "British Moss Flora," "Hookers' Flora Tasmaniae," and, for some generic determinations, to Engler and Prantl's "Pflanzenfamilien." Although every care has been taken, a few errors probably will have crept in, and must be corrected later.

The humid, forest-clad, eastern slopes of the National Park form one of the finest areas in Victoria for the growth of Bryophyta (Mosses and Hepatics), and we may confidently expect to find about 400 species (including Hepatics) within it. The Park has practically never been explored for non-vascular cryptogams, and future investigations will doubtless lead to very interesting results. The only instance, so far as I am aware, of mosses being definitely recorded from the area in question is in Baron Von Mueller's Australian Mosses—a work of 20 well-executed plates—where two species, *Hypnum calidioides* and *Conostomum perpusillum*, are recorded from Sealers' Cove; neither of these species was collected last January.

I have not attempted to give popular names in the subjoined preliminary list as these are not very definitely applied, and usually suggest little. The Hepatics have been excluded—although about 80 species were collected—on account of the great difficulty in determining the species satisfactorily. There are still some 20 species of mosses remaining to be identified, but these must be added to the list at some future date. Among them are some very interesting, and possibly new, forms.

TORTULACEÆ

Barbula rubella (Hoff.), Mitt.
Weissia, sp.

DICRANACEÆ

Ditrichum affine, C.M.
Campylopus pudicus, Hornsch
torquatus, Mitt.
capillatus, H.f. et W.
Dicranum spp. (none collected)
Ceratodon purpureus (L.), Brid.

LEUCOBRYACEÆ

Leucobryum candidum, Hpe.

GRIMMIACEÆ

Grimmia, sp.
Orthotrichum, sp.
Zygodon, sp.

MNIACEÆ

Rhizogonium distichum, Brid.
Hymenodon pilifer, H.f. et W.
Leptotheca Gaudichaudii, Schw.

FISSIDENTACEÆ

Fissidens pallidus, H.f. et W.

BRYACEÆ

Bryum bimum, Schreb.

BARTRAMIACEÆ

Bartramia, sp.

SPLACHNAOCEÆ

Tayloria octoblephara (Hook)
Mitt.

FUNARIACEÆ

Funaria hygrometrica (L.)
Sibth.

HYPNACEÆ

Mniodendron comosum (Lab.)
comatum (C.M.)
Hypnodendron spininervum
(Hook)
Rhaphidostegium homomallum
(Hpe.)
Hypnum aristatum, H.f. et W.
Ptychomnion aciculare (Brid.)
Mitt.
Thuidium, spp.

NECKERACEÆ

Hedwigidium imberbis (Sm.)

PTERYGOPHYLLACEÆ

Pterygophyllum nigellum
(H.f.W.), Jæg.
Distichophyllum
microcarpum (Hedw.)

LOPIDIAOCEÆ

Lopidium pallens (H.f. et W.)
Racomitrium cristatum
Cyatophorum bulbosum
(Hedw.), C.M.

POLYTRICHACEÆ

Catharinea Muelleri
(Hpe. et C.M.)
Polytrichadelphus majellanicus
(Hedw.), Mitt.
Dawsonia superba, Grev.
Polytrichum juniperinum, L.

REPRINTS FROM NATURALIST.

The author of a paper published in the *Naturalist* is entitled to receive 25 reprints free, if the Editor has been notified not later than a fortnight after the meeting at which such paper was read. But, in view of the high cost of printing, the Committee hopes that reprints of general papers, such as accounts of holiday trips, will not be asked for by the writers. In future, reprints will not be supplied unless they are ordered.—EDITOR.

THE FLORA OF BASS STRAIT.

On the occasion of the visit of members of the R.A.O.U. to the Furneaux Group, in November, 1912, the writer was one of the party which camped at Lady Barron, on Flinders Island. As the result of excursions made in the southern part of the island from a point east of the camp to Strzelecki Peak, rather more than 300 plants were noted or collected. Since then a search, which cannot be said to be exhaustive, was made for records of plants from this and the other islands of Bass Strait with the object of compiling a census. This has been done, and, though it cannot find a place here, it seems worth while to set down the sources from which data were obtained, and to make some remarks regarding certain species and their distribution.

From the *Flora Australiensis* one gathers that Robert Brown, Gunn, Milligan, Bynoe and others were the earliest collectors in the islands. Brown and Bauer, Baron von Mueller tells us, were in King Island as early as 1802. Backhouse, in his *Narrative*, mentions about a dozen species seen on Flinders Island during his three visits there, in 1832. Probably the first list of plants from any of the islands to be published accompanies the Baron's paper on "The Vegetation of King's Island," in the *Proceedings of the Royal Society of Tasmania* for 1881. This was made from material sent to him by the light-keeper there. In the 1884 volume of the same "A Complete Census of the Flora of Deal Island"—60 species—appeared, and doubtless here also the light-keeper was prompted to make the collection.

The reports of three excursions undertaken by the members of this Club contributed greatly to our knowledge of the natural history of the island, and though the bird life seems to have engaged most of the attention of the visitors, plants were not neglected.

The first of these excursions to King Island, in 1887, resulted in the collection of such plants as enabled the Baron to publish in the *Naturalist* a list including 16 introduced weeds, of 204 species which considerably exceeded that previously made by him. The item most interesting to him was a small composite *Nablonium calyceroides*, described by Cassini, in 1825, from a specimen from the same locality.



ROOKERY OF WHITE-BREASTED CORMORANTS (Storehouse Island, Bass Strait)

Photo, C. Barrett.

The second excursion was to Kent Group, in 1890, when the material submitted to the Baron led to the addition of 23 species to the Deal Island census.

The visit to the Furneaux Group, in 1893, was not so fruitful in plant records, for of the collection submitted to the Baron only a dozen were mentioned as being the more important.

In the account of the late Mr. E. D. Atkinson's visit to the Three Hummocks Island, in the *Naturalist* for February-March, 1890, the names of four plants occur, and 10 in that of the late Mr. J. Gabriel's risky venture to Albatross Island, in the *Naturalist*, for January, 1895. The islands, belonging politically to Tasmania, their plants are included in Rodway's *Tasmanian Flora*, but only the minority are described vaguely, as from "Bass Straits." Spicer, in his *Handbook*, is more definite, and generally mentions the particular island in which the species occurs.

From these sources, then, one is able to make up a list of 458 plants indigenous to the islands—340 occurring in the Furneaux Group, 214 in King Island, 121 in the Kent Group and 14 in the Hunter Group. The particular localities of some ten are still undefined.

These figures will, of course, be greatly increased when the northern part of Flinders Island, the southern, more densely forested, portion of King Island, which was not explored by the excursionists of 1887, Cape Barren and other islands, are more closely investigated.

On examining the list we find, as might be expected, that the great majority of the species are common to the adjacent parts both of Tasmania and the mainland. Those which are not—and as will be seen twenty-one do not extend to Tasmania and ten are not found north of the Strait—appear below. Two only are known from a single island.

Other species appear to have "jumped" the coastal districts as, for example, *Zygophyllum apiculatum* and *Spyridium crioccephalum* from our North-West to Flinders Island and *Populus aculeatum* to King Island.

It is interesting also to find *Elaeocarpus reticulatus*, from the one side, and *Phyllocladus rhomboidalis*, from the other, meeting in King Island. The presence, again, of *Melaleuca squamea*, *M. gibbosa* and *M. decussata* in Flinders Island is unexpected.

Occasionally records give rise to some doubt as when we see *Leptospermum myrsinifolium*, *Ozalis magellanica* and *Epacris heteromeles* attributed to Flinders Island. The latter is also supposed to yield two *Acacias*, one absent from

PLANT	TAS.	ISLANDS	AUSTRALIA
<i>Zygophyllum apiculatum</i> , F.v.M.	—	Flinders	W.A., S.A., Vic., N.S.W., Q.
<i>Myoporum humile</i> , R.Br.	—	"	W.A., S.A., Vic., N.S.W.
<i>Hakea flexilis</i> , F.v.M.	—	"	S.A., Vic., N.S.W.
* <i>Acacia oxycedrus</i> , Sieb.	—	"	S.A., Vic., N.S.W.
<i>Isopogon ceratophyllus</i> , R.Br.	—	"	S.A., Vic., N.S.W.
<i>Scaevola microcarpa</i> , Cav.	—	"	S.A., Vic., N.S.W., Q.
* <i>Melaleuca decussata</i> , R.Br.	—	"	S.A., Vic.
* <i>Thelymitra grandiflora</i> , Fitz.	—	"	S.A., Vic.
<i>Pseudanthus ovalifolius</i> , F.v.M.	—	"	Vic., N.S.W., Q.
<i>Pimelea axiflora</i> , F.v.M.	—	"	Vic., N.S.W.
<i>Zoysia pungens</i> , Willd.	—	King, Flinders	Vic., N.S.W., Q.
<i>Polypompholyx tenella</i> , Lehm.	—	"	W.A., S.A., Vic.
<i>Cotula filifolia</i> , Thunb.	—	"	W.A., S.A., Vic., N.S.W.
<i>Sicyos angulata</i> , L.	—	Sister Islands	Vic., N.S.W., Q.
* <i>Scaevola suaveolens</i> , R.Br.	—	King	S.A., Vic., N.S.W., Q.
<i>Elaeocarpus reticulatus</i> , Sm.	—	"	Vic., N.S.W., Q.
<i>Podotinea angustifolia</i> , Cass.	—	"	W.A., S.A., Vic.
<i>Casuarina bicuspidata</i> , Benth.	—	Flinders	W.A., S.A.
<i>Acacia crassiuscula</i> , Wendl.	—	"	N.S.W., Q.
<i>Didymotheca thesioides</i> , Hook.	—	Kent, Flinders	W.A., S.A.
<i>Ixolobea supina</i> , F.v.M.	—	Kent	S.A.
<i>Lasiopetalum discolor</i> , Hook.	Tas.	Hummock Island	W.A., S.A.
<i>Hibbertia hirsuta</i> , Benth.	"	Flinders	S.A.
<i>Nablonthum calyceroides</i> , DC.	"	King, Flinders	—
<i>Schoenus fluitans</i> , L.	"	Flinders	—
<i>Lomatia tinctoria</i> , R.Br.	"	"	—
<i>Ozothamnus Gunnii</i> , Hook.	"	"	—
<i>Bedfordia linearis</i> , DC.	"	"	—
<i>Pimelea cinerea</i> , R.Br.	"	"	—
<i>Phyllocladus rhomboidalis</i> , Rich.	"	Kent	—
<i>Thryptomene micrantha</i> , Hook.	"	Islands, Bass Strait	—
<i>Oenothera pulvinata</i> , Desv.	—	Kent	—
<i>Pratia irrigua</i> , Benth.	—	"	—

our State, *A. crassiusculus*, Wenol., which is perhaps *A. adunca*, A. Cam., and *A. sicutiformis*, no found in our southern districts.

A very striking shortage in species of Eucalyptus is evident. In Flinders Island we noted only *E. amygdalina* and *E. globulus*, the former scrubby but the latter making a fine unmixed forest, averaging perhaps one hundred feet high. These two, with *E. viminalis*, are reported from King Island, and the first-mentioned and *E. obliqua* from the Kent Group.

A most interesting deficiency shared with Tasmania is the absence of any Loranths in the islands, and also of the beautiful little bird, *Dicaeum hirundinaceum*, which is considered to be responsible for the spread of the pest.

A matter worth mentioning, perhaps, is the occurrence of *Goodenia ovata*, always an unattractive shrub, in a particularly objectionable shape, in the northern slope of Strezlecki Peak. Here, on rocky, broken ground, it was growing thickly over a wide area, with single, unbranched stems, about four or five feet high, quite unlike the bushy form it assumes with us, and it proved extremely difficult to traverse.

Until more complete plant lists of the island are available it is rather futile to make comparisons. The fauna is considered more akin to that of Tasmania, but the flora appears to be rather Australian.

The plant covers of the islands are seemingly remnants of the vegetation once continuous across the Strait, and the 33 plants listed above represent brokenly the limits of the range of the species.—C.S.S.

NATURAL HISTORY IN AUSTRALIAN ENCYCLOPAEDIA.

Many articles on the native fauna and flora are included in Vol. I of the "Illustrated Australian Encyclopædia," an invaluable work recently published by Messrs. Angus and Robertson Ltd., Sydney. They are by leading authorities, and are finely illustrated. Descriptions are given of a large number of plants, mammals, birds, reptiles, insects, etc., and many species are figured. There are coloured plates of birds and birds' eggs, typical insects of different orders, lizards, snakes and frogs, fishes and Australian seaweeds. As an example of the articles, that on Beetles may be mentioned. It occupies about five pages, and 12 species are figured on a half-tone plate. The whole work is admirable, and the natural history sections should do much to popularise our favourite subjects throughout the Commonwealth.—C.B.

ABORIGINAL STONE-AXES.

By EDWARD M. PESCOFF, F.L.S.

"Axe" is a term generally applied by the average man to any piece of stone which an aboriginal has taken, and, sharpening, more or less, one end, put to the various uses to which, in his so-called primitive mind it would, be of value to him. The aboriginal might need to hollow out a charred log for a canoe, or an elbow of a tree for a "coolamon," make toe-grips in a tree for climbing, or strip off slabs of bark for his canoe, or for his mia-mia. He would, in all these and other cases, use the implement which we collectively call an axe. Being a "stone man," his implements or axes are all made of stone.

"Any stone will make an axe," seems to have been the motto of this "stone man," for he was able to take and use any piece of stone, and shape, not "mould" it, to his purpose. If he were in basaltic country he would smash off pieces of basalt and select those that seemed to him most shapely; diorite stone was especially favoured, and of this stone many very fine axes were made. Any hard stone that came in his way was used; thus we have axes of chialiolite slate, gneiss, hard sandstone, limestone cores, and even flint. The Murray men and the inland tribes used water-worn pebbles of all sizes, "gibbers" from the desert country, and hard sandstone pebbles from the open plains.

The making of an axe from a water-worn pebble was a simple matter. The craftsman would simply select an oval, or elongated, pebble, and, by rubbing both sides of one end on a hard or rough stone, gradually work it down to an "edge." This grooved, grinding stone he, perhaps, carried about with him, or he may have had some rock-face to which he regularly repaired, a permanent sharpening station.

Usually the stone was ground down on both faces; but occasionally a wedge-shaped axe is found, made usually from a water-worn stone, which has been "sharpened" on one side only. Such axes are uncommon; and one of this kind in my collection has had the wedge-side chipped down instead of being ground. Such implements are more akin to the New Zealand axes and chisels, which are almost invariably chisel-shaped, instead of having both sides worked down.

The "modern" axe-maker—called the Neolithic man—would, after grinding down his axe-edge, bring it to a state of very smooth polish. Some of these axes have been polished to an almost incredible degree of smoothness. Diorite axes were very frequently polished. Some have the whole surface beautifully smoothed and polished. These were evidently used as hand-axes, and were not "hafted" or "handled."

In some parts of Australia there were tribes which included some very clever artificers, for the axes carry a groove which has been chipped or hammered out with a piece of stone, the groove completely circling the axe. This groove materially assisted in gripping the handle to the stone. In the Melbourne Museum there is such an axe having two grooves, the maker of which was truly a Tubal Cain among his associates. Other axes made by superior craftsmen had the whole of their surface "bossed" over, the maker hammering it with a stone, as a stonemason hammers and works down the rough surfaces of stone. Then the edge was ground down and polished.

The hafting of the axe, or the fixing on of a handle, was an important operation. A fairly thin strip of pliant tree-stem, averaging from 18 inches to 20 inches in length, and about an inch in width, was flattened somewhat on one edge. In Northern Queensland cane from the "Lawyer" palms was used. This strip was rendered supple by heating, and then bent in half, the axe being folded in the bend. The handle then was tied in position with string made from grass fibre, or from animal or human hair. The "hafter" next heated near the fire some of the gum, or resin, which he had collected as an exudation from the grass-trees. This grass-tree gum, after being well kneaded, was fastened, by pressing, all over the butt-end of the axe and around the handle, being worked and plastered until the stone axe was firmly fixed to the wooden handle. Occasionally the axe and handle were smeared over with red ochre or white limestone. Then it was ready for use. "Hafted" axes are very rare, the wood and resin readily disintegrating and decaying in the soil in a few years.

Axes are to be found almost all over Victoria. Along the coast where "middens" abound, the places where the blacks fed on shellfish, leaving the remains in great heaps; wherever they had their "kitchen" or "burial" middens; wherever animal life was abundant; by rivers and lakes, where fish could be obtained—these are the places where axes still

await the collector. Whenever they are found they should be treasured, for, with other stone implements and weapons, they are the sole monuments or memorials of a fast-decaying race—the “stone men” who lived in the days of modern electric and steel era.

LINKS WITH THE PAST.

The National Herbarium, Melbourne, has an extensive collection of Australian plants, gathered by Sir Joseph Banks and Dr. Solander. These links with the past were presented by the British Museum authorities.

On 28th April, 1770, Captain Cook's scientific companions of the famous voyage botanised on the shores of Botany Bay. The first specimen collected was one “which was large, yielding a gum, much like *Sanguis draconis*”—probably a *Eucalyptus* species. Several trees, which bore a fruit of the “*Jambosa* kind (*Eugenia*) in colour, much resembling cherries,” were also noted on that day. By 3rd May 200 quires of blotting paper had been used for drying the plants collected. The paper was made into book form.

The voyage was continued northward, and, landing at Bustard Bay, Banks and Solander collected *Pandanus*, *Ficus*, *Heteropogon*, *Coniortus*, etc. On 10th June the “*Endeavour*” struck a coral reef, part of which became embedded in her planks, thus preventing disaster. Many of the specimens stored in the hold were badly damaged. It was necessary to beach the ship on the banks of the stream now known as Endeavour River. The accident proved to be a blessing in disguise, as it gave the scientists much time for collecting plants. Once, their specimens were in danger, owing to a fire lighted by the aborigines.

Among the numerous species collected were the following:—*Hibiscus tiliaceus*, *Semecarpus australiensis*, “The Marking Nut,” *Glycine speciosa*, *Tetragona cornuta*, *Ficus caudiciflora*, *Cycas media*, *Livistonia australis*, *Eucalyptus* species, *Xanthorrhoea*, *Casuarina suberosa*, *Trichodesma zeylanica*, *Stylidium graminifolium*, *Isopogon anemonifolius*, *Beyeria opaca*, *Helichrysum apiculatum*, *Callistemon lanceolatus*, *Banksia serrata* (a genus named in honour of Banks), *Cassia minosoides* and *Adiantum ethiopicum*, “Maiden Hair Fern.”—J.W.A. and P.F.M.



BIRD ISLES OF BASS STRAIT.

Australia has its bird isles, not less wonderful in their way than those of Peru, concerning which a book has been published recently. Our Club, in the days of its youth, revealed a spirit more adventurous than that of its middle age, and carried out expeditions to the Bass Strait islands. The results were notable.

Why should we not go again to those isles of the sea? I have been twice among them, and commend the voyage, with many landings, to Club members, who would see "at home" Gannets and Gulls, Albatrosses, Petrels and the big, sea-faring Cormorants, that long bore the name of Gould (priority has decreed the change from *Phalacrocorax gouldi* to *P. fuscescens*.)

On Cat Island the Gannets, *Sula serrator*, nest in numbers, as they did more than 30 years ago, when a party of F.N.C. members explored the Furneaux Group. Three bird isles lie off the east coast of Flinders—Babel, Cat and Storehouse; the last-named is a nesting haunt of White-breasted Cormorants. Our pioneer fellow-members of the 1893 expedition saw them there, among the nests on granite terraces; and when, with other naturalists, I landed on Storehouse in November, 1908, the rookery was in occupation. Perhaps it is flourishing still; though there have been many changes in "island life" during recent years.

From 300 to 400 nests formed the Cormorants' rookery in November, 1893, but in 1908 the number was about 150. The population, doubtless, varies much from season to season. Nature herself may take toll of the birds, in various ways; and Cormorants are not protected against human enemies.

The group-photograph (Plate IV) was obtained after careful stalking. The Cormorants were wary; yet their neighbours, the Gannets, of Cat Island, declined to leave their nests when we walked among them.—C.B.

BEES' WINTER HARVEST.

Some years ago, on a sunny day in late winter, scholars under my charge at Hawkesdale, in the Western District, noticed bees (a colony was always kept in the school garden) flying in great numbers around the Golden Wattles, *Acacia pycnantha*, in the garden. A boy picked a phyllode and put it to his lips. His shout, "Honey!" was the signal for a rush of scholars to the trees. Investigating, I found that sweet liquid was exuding from the gland, a little swelling on the edge of the phyllode. I mentioned the matter to the late Mr. L. T. Chambers, an expert in bee management, who stated that he had noticed a similar occurrence at one of his apiaries, but the result of my subsequent enquiries shows that few people have seen bees feeding on nectar from these glands. In a paper contributed to the *Naturalist* (Nov., 1913), Mr. Reginald Kelly gives his views, and the results of his observations on the function of *Acacia* leaf glands. He failed to detect any sweet exudation, and his conclusion was that these organs perform excretory functions, that the secretions are neither fluid nor viscid, and that they are not strictly glands or nectaries, in the sense that the term gland or nectary does not accurately describe the nature of the growth. He suggests the name "vents," and writes of them as mere "functionless relics."—H.B.W.

HOW THE BLACK AND WHITE FANTAIL BUILDS ITS NEST.

Probably none of the smaller native birds has been more closely and lovingly studied than the Black-and-White Fantail, *Rhipidura leucophrys*; but I have read no account of one of its unique habits in nest-building. Since the end of September, 1921, I have made notes on eight nests, all, I believe, built by the same pair of birds. Nine nests were constructed, but I was unable to find the second one of the season 1922-23. Last season three nests were built, one early in October, the next in November, and the third at the end of December. All but two of the nests under observation were built in pine trees, *Pinus insignis*, one or other of a group, usually at a height of 8 feet.

The felt of cobweb, which forms the nest foundation and looks like a slight thickening of a thin, grey branch, is spread in position by the bird's head. Very often I have watched a Fantail, supported on swiftly-beating wings, gathering cobweb from the wall. A sudden dart forward, a quick twist

of the head, and grey strands of web lay across the black feathers. When this manoeuvre had been repeated two or three times, the bird would fly swiftly to its nesting site. It was, of course, impossible for me to reach it as quickly as the builder. One had either to wait by the wall, to watch the gathering of material, or at the tree to see it placed in position. Obviously, there was only one way for this to be done; the head was wiped up and down or across the branch until all the grey felt was safely transferred to the growing home. Later, of course, strands of hair, etc., were used.

Always the nest was moulded by the birds, as they sat in the nest, turning and pressing to shape it with their own curved breasts. The finishing of cobweb was spread over the nest in the same way as the foundations were laid. I was never able to watch the actual beginning, nor be sure when the last touch was given: but building seemed to occupy about a week. The eggs, as a rule, were not laid on consecutive days: and although three formed the usual clutch, sometimes only two, sometimes as many as four, were laid. Incubation occupies exactly 14 days; and, if undisturbed, the young remain in the nest for about the same length of time, then leave home, and do not return.—J.G.

WORKS ON THE FORAMINIFERA.

Mr. F. Chapman, in his "Notes on the Foraminifera" in the August number of the *Naturalist*, recommended certain works to the beginner, but a notable omission from these is his own book, "The Foraminifera: An Introduction to the Study of the Protozoa." This book is obtainable in Melbourne, and some knowledge of its contents will be found essential when the works of Brady, Cushman and other specialists are being studied. To the more advanced student, the article by J. J. Lister, F.R.S., on "Foraminifera," in Lankester's "Treatise on Zoology" (Second Fascicle, Part I, Introduction and Protozoa), is recommended. Dr. Brady's "Challenger Report" is now unpurchasable, but may be consulted in our Public Library. The monographs of Dr. J. A. Cushman are the most easily obtained of works on the foraminifera. Some of these may be purchased from the Government Printing Office, and others from the Carnegie Institution, both of Washington, U.S.A. They must surely rank among the lowest-priced scientific papers issued, but on account of the demand for them by those interested in oil geology, copies of his later works only are now held in stock.—W. J. PARK.

“THE SCIENTIFIC NAME OF OUR CLUB’S BADGE.”

Under this title appeared in this Journal (Vol. XLI, p. 220) for April, a review by Mr. F. Chapinan of the nomination of the shell utilised as badge by the Club. Ten years ago, I indicated the fact that the popular name in vogue was technically invalid, and, knowing of no substitute, I proposed what I regarded as a suitable equivalent. This name is now championed, somewhat late in the day, as science keeps moving, whether we move or not. Recently, when working through some Western Australian material, I recognised the Victorian shell, and, referring to Menke’s *Molluscorum Novæ Hollandiæ Specimen*, published in 1843, I found that on p. 21 he included *Buccinum fasciatum*, Lam, and, giving a description, added the information: “*Buccinum pyrrhum*, n. olim. in lit.” This means that before Menke recognised that the shells belonged to Lamarck’s species, he had given them the name noted above, and had sent specimens out with that name attached. Under the Laws, as soon as Lamarck’s name was invalid, Menke’s name became valid, and therefore the correct scientific name of the Club’s badge becomes

NASSARIUS PYRRHUS (Menke).

I have very carefully compared Western Australian shells with Victorian specimens, and they are undoubtedly con-specific.

TOM TREDALE.*

*By permission of the Trustees of the Australian Museum, Sydney.

NOTES FROM THE NATIONAL MUSEUM.

A FOSSIL CORAL.

The discovery of a new locality in Victoria for the interesting reef-forming “star-coral,” *Orbicella tasmanica*, has lately been made by our member, the Rev. Geo. Cox. The locality is at Flinders, on the Cape Schanck Peninsula, where a small exposure of foraminiferal and polyzoal limestone occurs, resting on the older basalt. A good description of this important fossil bed was given by another club member,

Mr. A. E. Kitson, C.M.G., in 1902 (Report on the Bryozoan Limestone at Flinders. Rec. Geol. Surv., Vic., vol. 1, pt. 1, pp. 49-51, and text-fig.). There is probably a danger of this fossil deposit being seriously damaged, if not entirely obliterated, by some projected "improvements" to the Golf Links.

The chief interest of the Flinders Limestone is that it contains an abundance of the curious group of the limy sponges known as the Lithonines, which are still living in Japanese seas; although until Dr. Hinde described specimens sent to him by Dr. T. S. Hall they were not recognised as fossils. As regards the previously-known localities for the above-named coral, they are rather widely separated, and since it is a shallow-water organism, it helps to supply data in relation to the former trend of the coast-line, in Miocene times.

The original locality from which Dr. P. M. Duncan obtained his type specimen is Table Cape, North-West Tasmania. Since then I have recorded it from the fossiliferous ironstone beds of Flemington, whilst Dr. T. Griffith Taylor and Messrs. F. A. Cudmore and J. A. Kershaw have collected it from the ferruginous limestones of Ooldea, on the East-West Railway, South Australia. Quite recently Miss I. Crespín has also recorded its occurrence in the Janjukian ironstone of Green Gully, Keilor. Mr. Cox's specimen is exceptionally well preserved, and he has presented it to the Museum collection.

F. CHAPMAN.

PHOTOGRAPHS FOR THE NATURALIST.

It is proposed, while funds permit, to include one plate at least in each issue of the *Naturalist*. Members are invited to submit prints for consideration by the Editor and the Publishing Committee. Unusual subjects are desired, not photographs of scenery, etc. Writers of papers might submit photographs suitable for illustrations.—Editor.

All contributions for the *Naturalist*, and letters to the Editor, should be addressed:

CHARLES BARRETT,

"Maralena," Maysbury Avenue,

Elsternwick, Vic.

CENSUS OF VICTORIAN PLANTS.

Supplement No. 3.

The following additions and alterations have been made to the Census of Victorian Plants by the Plant Records Committee of the Field Naturalists' Club of Victoria:—

"Nat. Herb" indicates that dried specimens have been found in the National Herbarium; "B" refers to those determined by Prince Donaparte.

- Page 1.—*Alsophila Cooperi*, F.v.M. Cooper Tree Fern . S. Otway, Nat. Herb. (B)
A. Rebeccae, F.v.M. Wig Tree Fern . E. Bemm R., Nat. Herb. (B)
Dryopteris queenslandica, Do. Northern Shield S. Moe, Nat. Herb. min. Fern (B)
D. tropica Domin. Tropical Shield Fern E. Genoa, Nat. Herb. (B)
D. glabella, C. Chr. Smooth Shield Fern E. Genoa, Nat. Herb. (B)
- Page 3.—*Asplenium adiantoides*, C. Chr. Pointed Spicenwort N.W. Nat. Herb. (B)
Polystichum aristatum, Presl. Awned Shield Fern N.E. Alp. Nat. Herb. (B)
Blechnum serrulatum, Rich. Serrate Gristle Fern S. Toolebewong, P. St. John.
B. laevigatum, Cav. Leather Fern . . . S. Dandenong Ra. Nat. Herb.
- Page 3.—*Adiantum capillus-veneris*, L. British Maidenhair S. Evelyn, P. St. Fern John (B)
- Page 5.—*Cyclophorus rupestris*, C. Chr. Rock Polypody . . E. Genoa, Nat. Herb. (B)
Gleichenia habellata R. Br. Fan Fern S.E. Nat. Herb. (B)
G. laevigata, (Willd.), Hk. Spreading Fan Fern All but N.W.
- Page 16.—After *Bartlingia* add—
Borya nitida, Labill. Shining Borya . . . S.W. Hall's Gap, C. D'Alton.
- Page 18.—*Frasophyllum Colemanae*, Lilac Leek-orchid S. Bayswater, Mrs. Rogers Coleman.
F. gracile, Rogers S. Ringwood, C. French, Jnr.
- Page 19.—*Microtis oblonga*, Rogers S.W., S., N.E., E. E. Pescott.
- Page 20.—*Pterostylis decurva*, Rogers S. Fern-tree Gully, E. E. Pescott,
P. truncata, Fitz. Brittle Greenhood S. You Yanga, W. H. Nicholls.
- Revision of the Genus *Bassia*, (Anderson, Proc. Linn. Soc. N.S.W. Vol. XLVIII, Pl. 3.)
- Page 26.—For *Bassia diacantha* read *B. uniflora* (R. Br.) F.v.M.
Delete *B. lanicuspis*, *B. biflora*, *B. divaricata*, *B. echinopsila*, and *B. enchylaenoides*.

- Add *B. patentiuspis*, Ander- Spreading Saltbush N.W. Nat. Herb.
son
- B. thicuspis*, (F.v.M.) Ander- Three-spined Salt- N.W. Nat. Herb.
son bush
- B. parviflora*, Anderson, . . Small flowered Salt- N.W. Nat. Herb.
bush
- Kochia brachyptera* is now *Bassia brachyptera*, (F.v.M.), Anderson.
- Page 33.—*Acacia saliciformis*, D.C., Sickie Wattle . . . S.W. Nat. Herb.
- Revision of the Genus *Pultenaea*, (Williamson, Proc. Roy. Soc., Vic.
Vol. XXXVII, Pt. 1.)
- Pultenaea pubescens*, H.B.W. Downy Bush Pea : S.W. Portland, Nat.
Herb.
- Page 35.—*Pelargonium inodorum*, Willd. Scentless Storksbill All. Nat. Herb.
Formerly included in *P. australe*, Willd.
- Revision of the Family *Loranthaceae*, (Blakely, Proc. Linn. Soc.,
N.S.W., Vol. XLVII, Pt. 2.)
- Delete *Loranthus celastroides*, and substitute:—
- Page 24.—*Phrygilanthus celastroides*, Coast Mistletoe . . S.W., S. N.W.
Eichl.
- P. eucalyptifolius*, Engl. Common Mistletoe, All.
- Loranthus Miquellii*, Lehm. . . Long-leaf Mistletoe S.E. Nat. Herb.
- L. Preissii*, Miq. Wire-leaf Mistletoe All.
- For *L. longiflorus*, Desv. read *L. vitellinus*, Sieb. E. Genoa, Rev. A. J.
Maher.
- Page 33.—*Acacia argyrophylla*, Hook . . Silver Mulga . . . N.W. Nat. Herb.
- A. brachybotrya* Grey Mulga . . . N.W.
- Page 46.—*Eucalyptus agglomerata*, Grey Stringybark . S. P. St. John.
Maiden
- E. Dalrympleana*, Maiden . . Mountain White N.E., P. R. Sims.
Gum
- Page 48.—*Eucalyptus phellandra*, R. T. Mountain Pepper- S. P. St. John.
Baker mint
- E. unilata*, R.T.B. Island Blue Gum . S. Phillip I., Dr.
Heber Green.

NEW LOCALITIES.

The following are the additions to the regional distribution and are listed under the districts S.W.; N.W.; S.; N.E.; E., with the names of the field workers who have made the record possible. The figures refer to the pages in the Census.

- S.W.—(18) *Prasophyllum Archeri*, HK, f.; *P. brachystachyum*, Lindl; *P. imbricatum*, R. Br.; *P. odoratum*, Rogers. (19) *Calochilus campestris*, R. Br.; *Microtis parviflora*, R. Br.; *Caleana minor*, R. Br.; *Caladenia filamentosa*, R. Br.; *C. leptochila*, Fitz.; *C. reticulata*, Fitz., *C. angustata*, Fitz. (20) *Pterostylis concinna*, R. Br.; *P. parviflora*, R. Br.; (22) *Casuarina Luehmanni*, R. T. Baker. (23) *Grevillea rosmarinifolia*, A. Cunn; *G. repens*, F.v.M.; *Persoonia rigida*, R. Br. (24) *Bankia ornata*, F.v.M. (32) *Acacia armata*, R. Br. (33) *A. pectinervis*, Sieb. (36) *Dillwynnia hispida*, Lindl. (39) *Eriostemon difformis*, A. Cunn. (44) *Hibbertia humifusa*, F.v.M. (45) *Pimelea axiflora*, F.v.M. (49) *Callistemon rugulosus*, D.C., *Melaleuca neglecta*, Ewart and Wood.—Grampians, Chas. D'Alton.
- (46) *Eucalyptus Blaxlandii*, Maiden and Cambage.—Grampians, J. W. Audas.
- N.W.—(20) *Diuris punctata*, Smith; Wall, Miss I. Francis.
- S.—(13) *Carex polyantha*, F.v.M.—Lerderderg. H. R. Williamson.
- (20) *Caladenia reticulata*, Fitz.—Belgrave; E. E. Prescott,
- (35) *Pultenaea*, D'Alton; H.B.W.—Brisbane Ranges, Dr. Sutton.
- (47) *Eucalyptus nitens*, Maiden.—Donna Beang, P. R. St. John.
- (68) *Helipterum pygmaeum*, Bth.—You Yangs, A. C. Gates.

- N.E.—(19) *Thelymitra pauciflora*, R. Br.; (20) *Caladenia cordiformis*, Rogers; *Olearia Gunniana*, Hk. f.—Beechworth, Miss J. Galbraith.
 (20) *Caladenia angustata*, Fitz., Nat. Herb.
 (46) *Eucalyptus Bridgestana*, R.T.B.; (48) *E. Smithii*, R.T.B.; *E. camphora*, R.T.B.; P. R. Sims.
 (52) *Olearia flavescens*, Hutch.—Alps, A. J. Tadgell.
- E.—(6) *Dianthus barbatus* minor, (R. Br.); Buch., (11) *Cyperus exaltatus*, Retz; C. Gunni, Hk. f. (13) *Carex polyantha*, F.v.M.; (15) *Juncus pallidus*, R. Br. (19) *Corysanthes simbricata*, R. Br. (31) *Drosera Planchonii*, Hk. f. (Menziesii), (33) *Acacia Mitchellii*, Bth. (53) *Brachytonia daphnoides*, Bth. (57) *Ajuga australis*, R. Br. (62) *Selliera radicans*, Cav. (64) *Calceophthalus lacteus*, Less.—Bairnsdale, T. S. Hart.
 (20) *Caladenia latifolia*, R. Br.; *C. cardiochila*, Tate; (49) *Hibbertia densiflora*; (55) *Sebaea albidiflora*, F.v.M. (61) *Pratia platycalyx*, Bth. (65) *Brachycome stricta*, D.C.—Speers' Whale Head, F. Barton, Jr.
 (19) *Microtis parviflora*, R. Br. (20) *Caladenia Menziesii*, R. Br.; *C. testacea*, R. Br.; *C. angustata*, Fitz.; *Diuris palachila*, Rogers; *Pterostylis nana*, R. Br. (32) *Acacia arcuata*, R. Br.; *A. pycnantha*, Bth.—Tyers, Miss J. Galbraith.
 (65) *Bidens tripartita*, L.; Snowy R. only in Census.—Newry, D. J. Maher.
 (49) *Kunzea coriifolia*, Reichb.—Wilson's Promontory, Dr. Sutton.

CORRECTIONS.

The following corrections should be made:—

Supplement No. 2.—Delete *Fraxophyllum album*, Rogers.

Page 33.—*Callistachys elliptica*, Vent. *C. alpestris*, Ktze, *C. procumbens* (F.v.M.) Engl. *C. triloba*, (F.v.M.) Engl. for *Oxylobium* spp.

- .. 31.—*Drosera Planchonii*, Hk. f. for D. *Menziesii*, R.Br.
 .. 34.—*Acacia Victorice*, Bth. for *A. gentile*, F.v.M.
 .. 36.—*Dillwynia uncinata*, (Turcz.) J. M. Black, for *D. patula*, F.v.M.
 .. 36.—*Eutaxia microphylla*, (R.Br.) J.M.E. for *E. empetrifolia*, Schlecht.
 .. 37.—*Templetonia stenophylla*, F.v.M. for *T. Muelleri*, Bth.
 .. 38.—Transpose *Geranium pilosum*, Forst and *G. dissectum*, L.
 .. 39.—*Phebalium squameum*, (Labill.) Engler for *P. Billiardieri*.
 .. 41.—*Gymnosporia* for *Celastrus*.
 .. 40.—*Correa rubra*, (Smith) J. M. Black, for *C. speciosa*, Andr. Red. *Correa*, Add *C. rubra*, var *virens*. Common *Correa* (Green).
 .. 41.—*Stachytia monogyna*, Labill. for *S. linearifolia*, A. Cunn.
 .. 45.—*Callistemon citrinus*, (D.C.) Stapf. for *C. lanceolatus*, D.C.
 .. 50.—*Thryptomena calycina*, (F.v.M.) Stapf. for *T. Mitchelliana*, F.v.M.
 .. 75.—*Bartschia* for *Bartsia*.
 Bellardia Trixago for *Bartsia Trixago*.
 Sinapis arvensis for *Crassica Sinapistrum*.
 .. 77.—*Festuca myuros* for *F. myurus*.
 .. 78.—*Glaucium flavum*, Crantz, for *G. luteum*, Scop.
 .. 79.—*Mellilotus indicus*, (L.) Allion. for *M. parviflora*.
 Mellilotus albus for *M. alba*.
 .. 82.—*Coronopus procumbens*, Gilib. for *Senecioia coronopus*, Poir.
 C. didyma, (L.) Smith for *S. didymus*, Pers.
 Medicago arabica, (L.) Willd. for *M. maculata*.
 Medicago hispida includes *M. denticulata*. Delete latter.
 .. 75.—*Silybum Marianus*, (L.) Gaertn. for *Carduus Marianus*, L.
 Cirsium arvense, (L.) Scop. for *Carduus arvensis*, L.
 Cirsium lanceolatus for *Carduus lanceolatus*, Scop.
 .. 53.—*Lochnera rosea*, (L.) Reichb. for *Vinca rosea*, L.

The Victorian Naturalist

VOL. XLII—No. 6

OCTOBER 9, 1925

No. 502

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, September 14, 1925. The President, Mr. Geo. Coghill, occupied the chair, and about fifty members and friends were present.

CORRESPONDENCE AND REPORTS.

A letter from the Secretary of the Garden-week Committee, inviting the Club to take charge of the Wild-flower Section at the Garden-week Exhibition, was received and referred to Committee.

Reports were given as follows:—

Mr. C. Daley, excursion to You Yangs on August 15; Mr. Stickland, excursion to Kilby, Lagoon on August 29; Mr. A. E. Rodda, excursion to Studley Park on September 5; and Mr. E. E. Pescott, excursion to Diamond Creek on September 12.

GENERAL.

It was resolved, on the motion of Messrs. Daley and H. B. Williamson, that the thanks of the Club be sent to the Minister for Lands, the Hon. A. W. Downward, for his action in securing the reservation of Mt. Drummer.

Mr. A. J. Tadgell moved that the thanks of the Club be tendered to the Plant Records Committee for their work in compiling the additions to the "Census." Mr. F. Pitcher seconded the motion, which was carried unanimously.

Mr. C. Barrett said that he had heard that it was proposed to form a parking area for motor cars at the entrance to Belgrave Gully, and, if this were so, he thought that the Club should protest against any encroachment on the area reserved.

Mr. C. Oke moved that the matter be referred to the Committee, Mr. Pitcher to make enquiries at Belgrave as to

what was proposed, and report to the Hon. Secretary. Seconded by Mr. Williamson, and carried.

ELECTION.

On a ballot being taken, Mrs. F. Chapman, Threadneedle Street, Balwyn; Miss Jean Harvie, Chanak Street, East Malvern; and Miss C. Piper, Black Street, Brighton, were duly declared elected as ordinary members of the Club.

PAPERS.

1. "The Royal Botanic Gardens, Kew, England," by Mr. A. E. Keep. The author gave a history of the Gardens, and described features of special interest. He also referred to different species of Australian plants growing at Kew.

2. "Victorian Ants" (Part II), by Mr. J. Clark. Owing to the lateness of the hour when this paper was called it was taken as read.

EXHIBITS.

By Mr. G. Coghill—*Grevillea rosmarinifolia*, *G. oleoides*, *G. alpina*, *Thryptomene Mitchelliana*, *Micromyrtus microphylla*, *Eriostemon myoporoides*, *Acacia myrtifolia*, *A. acinacea*, and *Hardenbergia monophylla*; all grown at Canterbury.

By Mr. J. R. Leslie—Mosses from Wilson's Promontory, in illustration of article in September *Naturalist*.

By Mr. V. H. Miller—*Cyrtostylis reniformis* and *Corysanthes pruinosa*, from Black Rock.

By Mr. F. Pitcher—Author's presentation copy to Mrs. Flora Martin, of Cooke's *Handbook of Australian Fungi*, with a letter to Mrs. Martin from the New South Wales Government, intimating its contribution of £105 towards cost of publication of the work.

By Miss J. W. Raff—Living Land Planarian, *Bipalium*, from Queensland, and two well-developed young, produced by fission last June; also fresh fragment, just beginning to form a head. Collected by Mr. D. F. Thomson near Brisbane, May, 1925.

By Mr. A. E. Rodda—Shells, Organ-pipe Coral and Flat Sea Urchin, from Cairns, Queensland; also Miocene Fossil Sea Urchin, for comparison with Queensland specimen.

THE ANTS OF VICTORIA.

By J. CLARK, F.L.S.

[PART II.]

(Communicated by C. Barrett)

*Read before the Field Naturalists' Club of Victoria,
September 12, 1925.*

Sub-family PONERINÆ, Lepageletier.

The ants of this sub-family are large or of moderate size, and the workers and females are armed with a formidable sting. The petiole is composed of only one joint, or node. In some genera the post-petiole, or first segment of the abdomen, is greatly constricted behind, as in *Myrmecia*, making this section appear to be two-jointed. In other genera, as *Amblyopone*, the node is attached to the post-petiole throughout its entire posterior surface, with the result that these ants do not show a distinct node when seen in profile.

The Ponerina are the most ancient group of ants, and are the stock from which the higher, specialised sub-families arose. Nowhere are they a dominant group, except in Australia, where, according to Prof. W. M. Wheeler, "these ancient insects occupy a position amongst ants analogous to that of the monotremes and marsupials among animals, and the *Rhynchocephalia* among reptiles. And it is especially the genus *Myrmecia*, comprising the 'Bull-dog Ants,' which may be said to characterise this fauna, and, at the same time, to represent the prototype of all ants."

All the species form small colonies, usually in the ground, under logs and stones. Some, however, may be found nesting in rotten logs, and in tree-stumps. The life-history and habits of most of our species are unknown, but they may be regarded as being insectivorous. Many species, of several genera, may be found hunting on trees and shrubs in flower, where they obtain numbers of small insects. Frequently they are seen sipping the nectar of the blossoms. This applies particularly to *Myrmecia*, *Rhytidoponera*, and *Chalcoponera*. No species has been observed attending aphids, scale-insects, or mealy-

bugs on the trees; but at least one species, *Euponera lutea*, generally has a large number of mealy-bugs in its nest.

The nests of *Ponerina* are much frequented by other insects. Colonies of *Chalcopanera* and *Euponera* are rarely without visitors, insects of some of the other orders. Other Arthropods, such as mites, pill-bugs, etc., are also commonly found in most nests.

The sketch reproduced here illustrates the principal portions of an ant. The terms (and the positions indicated) are

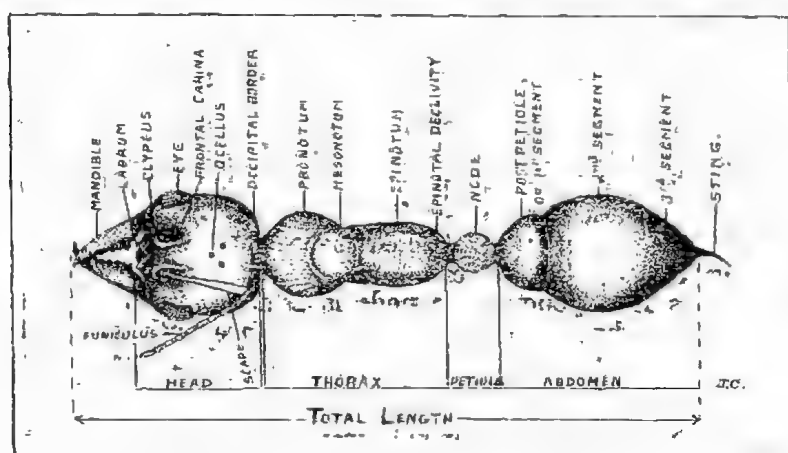


Fig. 1.—*Myrmecia* (*Proimyrmecia*) *aberrans*, Ford.
Dorsal view of the worker to show the principal parts.

those generally used in literature, and will be adopted in these articles.

Tribe AMBLYOPONII.

This tribe is represented in Australia by two genera, namely, *Amblyopone* and *Myopopone*; only the first, however, has so far been found in Victoria.

Genus, *Amblyopone*, Erichson.

Erichson, Arch. fur. Naturg., vol. III, p. 260, pl. 5, fig. 7, 1841.

Emery, Genera Insectorum, base. 118, 1911.

In this genus the petiole consists of one joint; this is articulated over the whole of its posterior surface with the

first segment of the abdomen. The mandibles are long and narrow, with few teeth on the inner border. Eyes very small. Antennæ 12-jointed.

These are primitive ants, living in small colonies in the ground. They may sometimes be found under logs and stones. I have several times found nests in rotten logs in S.W. Australia. These logs always contained colonies of Termites, and the larvæ of Lamellicorn beetles, upon both of which, no doubt, the *Amblyopone* depend for food.

Ants of this genus do not expose themselves during the day, nor have I seen them on the surface of the ground. They shun the light. They travel long distances under half-buried logs and stones, and have tunnels diverging in all directions. The actual nest is rarely seen in such situations, being generally deep underground. I have found the queens and the brood only in rotten logs. Frequently several fertile females may be present in one colony. The winged males and females are observed in the nests, running with the workers, during January and February.

At present little or nothing is known concerning these ants. The fact that, generally, they are found in comparatively moist, or damp, situations, where beetle and other larvæ abound, suggests that they prey on these; probably also on Termites.

5. *AMBLIOPONE AUSTRALIS*, Erich. Ferntree Gully (F. P. Spry, J. E. Dixon, L. B. Thorn, C. Barrett); Beaconsfield (F. E. Wilson).

Erichson, *Arch. fur. Naturg.*, 8, p. 260, pl. 5, fig. 7, 1841, ♂; Smith, *Cat. Hymn. Brit. Mus.*, 6, p. 109, pl. 7, figs. 21-24, 1858, ♂ & ♂.

Amblyopopone australis, Er., *Froggatt, Agric. Gaz.*, N.S.W., 1905.

- *Amblyopone australis*, Er. Ern. Andre, *Rev. d'Ent.*, 15, p. 260, 1906, ♂ & ♀. Emery, *Gen. Insect.*, Fasc., 118, 1911.

Originally described from Tasmania, this species is found throughout Southern Australia. It is about one-third of an inch in length, and varies in colour from light ferruginous to dark brown. The head is coarsely, but not densely, punctate, except in front. The thorax is smooth and shining, and has a few scattered punctures. The mandibles are long and nar-

row, with 5-6 teeth on the inner border. The eyes are very small, and there are no ocelli. The antennæ are short, the scapes not reaching beyond the eyes.

The female is larger than the worker, and is winged. She has larger eyes, and three well-developed ocelli.

The male is black, with the antennæ, tibia, and tarsi yellowish. The mandibles are small and triangular. The antennæ are 13-jointed. The thorax is densely punctate; the node almost smooth. The worker and the female are provided with a large and powerful sting.

6. *AMBLYOPONE AUSTRALIS*, Er., var. *OBSCURA*, Smith. Ferntree Gully (F. P. Spry); Belgrave (F. E. Wilson).

Amblyopone obscura, Smith, Cat. Hymn., Brit. Mus., 6, p. 109, 1858 ♀♀.

Amblyopone australis, Er., var. *OBSCURA*, Sm. Froggatt, Agric. Gaz., N.S.W., 1905; Forel, Rev. Suisse Zool., 18, p. 2, 1910, ♀♀; Emery, Gen. Insect., Fasc., 118, 1911.

This variety has a wide distribution in Eastern Australia, ranging from Tasmania to North Queensland. It is much like *australis*, but is larger and darker in colour. The head is more densely punctate behind, and more definitely striate in front. The epinotal declivity, in both the worker and the female, is inclined to be transversely rugose; in *australis* it is smooth and shining.

The male differs from the male of *australis* much more than the workers of the two species differ. It is much larger and more strongly sculptured. The thorax and node are densely punctate. The antennæ and legs are darker in colour.

7. *AMBLYOPONE FERRUGINEA*, Smith. Ferntree Gully (F. P. Spry); Belgrave (F. E. Wilson); Woori Yallock (L. B. Thorn).

Smith, Cat. Hymn., Brit. Mus., 6, p. 110, 1858, ♀.

Froggatt, Agric. Gaz., N.S.W., 1905.

Ern. Andre, Rev. d'Ent., 15, p. 261, 1906, ♀♀; Emery, Gen. Insect., Fasc., 118, 1911.

A small species, barely a quarter of an inch in length. It is yellowish, or reddish yellow. The head and pronotum are

finely, and longitudinally, striate. The remainder of the body is smooth and shining.

The female is slightly larger than the worker, and is winged. The head, thorax and node are brownish black; the mandibles, antennæ, legs and abdomen reddish, or yellowish red. The male is unknown.

This species appears to live in small colonies, under stones. At present nothing is known concerning its life history, nor habits.

Tribe MYRMECINI, Emery.

This tribe contains only one genus, and is purely Australian.

Genus *Myrmecia*, Fabr.

Fabr., Syst. Piez., p. 423, 1804.

This is a large genus, and, with the exception of one from New Caledonia, all the species are found only in Australia and Tasmania. They rank among the largest of known ants; some examples measuring up to $1\frac{1}{2}$ inches. They are very conspicuous, and most of the species are very aggressive. They will generally follow an intruder for some distance, if the nest is disturbed. The genus is well represented throughout Australia, but is more abundant, in species and individuals, in the coastal areas than in the dry interior. Some species, however, range far inland, and a few appear to be confined to the interior. Some of the species are widely distributed, while others are very local. When searching for food, in the trees or on the ground, these ants are fearless, attacking every living thing they meet. Even man himself they do not fear. They seem to have a strong objection to picnic parties, and, perhaps, have disorganised more picnics than all the other animals of the bush together.

This genus has been divided into four sub-genera, based mainly on the size and formation of the mandibles and the antennæ. This division, however, is not very satisfactory. Emery, in the *Genera Insectorum* (1911), erected two sub-genera, *Promyrmecia* and *Pristomyrmecia*, to contain some species which were certainly out of place in the genus *Myrmecia*, s.str. Both of these sub-genera contain only jumping species; but, apparently, Emery did not know that half the species of the whole genus are jumpers. The *Myrmecia*,

s.str., do not jump; they are walkers, or runners. Wheeler*, in dealing with "jumping ants," noted that the jumpers had not been separated, so he erected another new sub-genus, *Halnamyrmecia*, to contain these, with *M. pilosula* as the type. Something had to be done to correct the distribution made by Emery; but it is doubtful whether the new sub-genus tends to improve matters. Both the sub-genera erected by Emery are composed of jumpers, and the anatomical details are not sufficient to warrant such separation, as, under these conditions, it almost becomes necessary to erect a sub-genus for every other species.

The variations in the formation of the mandibles and the length of the scapes is very great among the jumpers. In many cases it is almost impossible to say definitely in which of the sub-genera some of the more obscure forms should be placed. To avoid further confusion, I maintain only two divisions of the genus, and separate them into *Gressoria*, *Myrmecia*, Fabr. s.str., and *Saltatoria*, *Promyrmecia*, Emery.

The *Gressoria* contains *M. Gulosa*, *vindeæ*, *forficata*, and their allies, all of which are species with long legs adapted for walking only. The *Saltatoria* contains *M. (P) aberrans*, *pilosula*, *mandibularis*, and their allies, all of which have short legs, and the posterior pair adapted for jumping. They have the femora of the hind legs slightly thickened, and are able to leap some inches along the ground. The formation of the mandibles is variable in this section, but the antennal scapes rarely pass the occipital border in the workers.

The *Gressoria* are the largest of the Bull-dog Ants, and generally construct their nests in the ground. When the nest is underground they raise a more or less cone-shaped mound on the surface with material excavated. The entrance usually is at the summit, and is an irregular opening, from one to four inches in diameter. Occasionally nests are found under logs or stones, and, in some localities, even in rotten logs. The colonies are small, rarely numbering more than 200 individuals. Sometimes the number is greater, but more often about 100 individuals comprise the colony.

The ground-nest usually goes down two feet, almost vertically. There is a series of three or four pockets on the ground level, just under the mound. Similar pockets occur

*Wheeler, Observations on *Gigantiops destructor*, Fabricius and other Leaping Ants; *Biological Bulletin*, Vol. XLII, No. 4, 1922.

at intervals down the shaft, which terminates in a large chamber. During the summer months the brood, more particularly the pupæ, generally is in the surface pockets. At the first alarm the brood is carried to the bottom chamber.

The winged males and females are found in the nests during the summer. Usually the nuptial flights take place, during the afternoon, in the period from February to April. After the flight the male dies, but the female, using her legs, breaks off her wings. She constructs a cell under a log or a stone, in which she deposits her eggs. Sometimes three or four females, with their eggs, are discovered in one cell, under a stone. When the eggs hatch these females fight with each other until but one remains alive to found the new colony. There is only one queen in a nest. In many instances ergatoid females have been found in the nests with queens. These females differ from the workers only in having the thoracic sclerites more developed; sometimes wing-pads are present, but no wings.

These ants hunt in bright sunlight, rarely, if ever, coming out at night. The food consists mainly of the nectar and exudations of trees and plants. The larvæ, however, are insectivorous, and are supplied with insects and caterpillars as food.

S. MYRMECIA GULOSA, Fabr.

Formica gulosa, Fabr., Syst. Ent., p. 395, ♀, 1775.

Myrmecia gulosa, Fabr., Smith, Cat. Hymen., Brit.

Mus., 6, p. 143, 1858; Lowne, Entomologist, 2,

p. 1865; Mayr., Jour. Mus. Godeff., XII, p. 95,

1876; Froggatt, Agric. Gaz., N.S.W., pp. 5 and

9, pl. 1, fig. 3, 1905; Emery, Gen. Insectorum,

Fasc., 118, p. 21, 1911.

This species was selected by Emery as the type of the genus. It does not appear to be common in Victoria, although plentiful in all the other Eastern States. The workers measure from $\frac{3}{4}$ to fully 1 inch in length. The head and most of the body are reddish-yellow; the three apical segments of the abdomen are black. The first segment of the abdomen is yellowish, like the body. The jaws are yellow and the teeth brownish.

9. MYRMECIA NIGRISCAPA. Roger. Cheltenham (C. Barrett); Belgrave (F. P. Spry); B. Thorn; Greytown (J. E. Dixon); Portland (H. W. Davey).

Roger. Beryl. Ent. Zeitschr., p. 33, 1861, ♀; Mayr,
Verh. Zool. Bot. Ges. Wien., XII, p. 723, 1862, ♀;
Froggatt, Agric. Gaz., N.S.W., p. 1905, ♀;
Emery, Gen. Insect. Fasc., 118, p. 9, 1911, ♀.

This species is very close to the preceding one. The colour is a little darker, more reddish. The antennal scapes are blackish brown. The apical segments of the abdomen are reddish; in *gulosæ* they are black. The workers measure from 17 mm. to 26 mm.

The female closely resembles the worker, but is larger (26 mm. to 29 mm.). The colour is darker, and the sculpture stronger. The head is broader behind, nearly square. The antennal scapes do not extend so far beyond the occipital border as they do in the worker. The node is more strongly rugose. The wings are hyaline.

The male (length 15 mm. to 18 mm.) is differently coloured from the worker. The head is reddish, with the occipital border and the sides blackish. The pronotum and scutellum are blackish, tinged with red. The remainder of the thorax, node, first segment of the abdomen, legs and antennæ are yellowish red. The mandibles are yellow; the wings hyaline.

This ant has a wide range, extending from Bunbury, Western Australia, round the Southern Coast to Rockhampton, Queensland. It constructs the usual dome-shaped mound-nest, but occasionally nests under logs and stones. The dealated* females may be found, during May to July, in cells under stones, with their eggs. The eggs are small, slightly under 2 mm. in length and 1 mm. in width; they are yellowish-white. From five to seven eggs are laid at a time. The eggs hatch in from six to nine days, but six to seven months elapse before the first ants appear. These are always small examples, owing no doubt to the scarcity of food. The first brood are raised entirely by the female. While rearing this small family the queen devotes much time to excavating a nest. By the time the first ants appear she generally has a small nest, about 6 inches underground, where the larvæ and pupæ are stored. On the arrival of the small family the female stops all work and devotes her energy entirely to egg-laying.

*Females which have dropped their wings.

The new workers at once enlarge the nest, and attend to all future eggs, larvæ and pupæ. The second, and subsequent, broods usually are normal size, as the workers procure the food. Sometimes a few small workers may be found, particularly in spring. These are regarded by some naturalists as minor workers, but I consider that they are merely the result of a scarcity of food during the winter months.

10. *MYRMECIA VINDEX*, Smith. Sea Lake (J. C. Goudie); Mallee (J. E. Dixon).

Smith, Cat. Hymn. Brit. Mus., 6, p. 147, 1858, ♂;
Mayr, Verh. Zool. Bot. Ges. Wien., XII, p. 72,
1862, ♂; Froggatt, Agric. Gaz., N.S.W., p.
10, 1905; Emery, Gen. Insect., 118, p. 11, 1911;
Crawley, Ent. Mon. Mag., 3, III, p. 119, 1922.

This species was originally described from Western Australia. It is, however, widespread through Southern Australia.

The worker (length 16 mm. to 25 mm.) is rather slender. The colour is reddish-yellow, with the whole of the abdomen shining black. The mandible and clypeus are a clear yellow, with the teeth brown.

The female is larger (23 mm. to 27 mm.), but closely resembles the worker. The wings are long.

The male (15 mm. to 18 mm.) is coloured very much like the worker, but has the first segment of the abdomen also reddish-yellow. In this sex the mandibles are small and triangular, with only three teeth. The antennæ are 13-jointed, and almost as long as the body; the scape is very short.

The life and habits of this species are similar to those of the preceding, but the workers are more pugnacious. They drop off trees and plants on to the passer-by more readily than do more other species.

11. *MYRMECIA VINDEX*, Smith, var. *DESERTORUM*, Wheeler. Maldon (J. C. Goudie); Mallee (J. E. Dixon).

Wheeler, Proc. Roy. Soc., S. Aust., XXXIX, p. 805,
1915, ♀.

This variety was described from specimens collected at Todmorden, South Australia. It is widely distributed in the inland portions of West Australia, South Australia, Vic

toria, and New South Wales. It varies much in size and slightly in colour. It is of a much lighter yellow than *vindex*; the head and abdomen are dark brown, sometimes almost black. It is also more densely covered with fine hairs than *vindex*; while the striation of the thorax and node usually is not so strong.

The female resembles the worker very closely, but is slightly larger.

The male is very much like the male of *vindex*, but the first abdominal segment is black, not reddish, as in *vindex*.

In Central Western Australia this species generally nests in the roots of trees. My friend, Mr. J. Hickmer, of Jigalong, states that the natives call it "Toon-jee," and treat it with great respect.

12. *MYRMECIA VINDEX*, Smith, var. *NIGRICEPS*, Mayr., Cheltenham (C. Barrett); Ferntree Gully (F. P. Spry); Portland (H. W. Davey).

Myrmecia nigriceps, Mayr. Verh. Zool. Bot. Ges. Wien., XII, p. 725-728, 1862, ♂; Froggatt, Agric. Gaz., N.S.W., p. 9, 1905.

Myrmecia vindex, Sm., var. *nigriceps*, Mayr. Forel, Fauna Sud-west. Aust. 1, 7, pp. 264-266, 1907; Emery, Gen. Insect., 118, p. 11, 1911; Viehmeyer, Arch. fur. Naturg., 79, p. 28, 1913, ♂.

This variety is distributed throughout Australia. It is slightly larger and darker than *vindex* or *desertorum*, and the sculpture is stronger than in both of these; the head is broader behind. In all other respects it is much like *vindex*.

Viehmeyer described, with doubts, a single male from South Australia as the male of this species. According to his description, the specimen most certainly does not belong to this species. The male of *nigriceps* is almost identical with the male of *vindex*, differing only in its slightly darker colour.

I have, growing in my garden at Sandringham, a Myrtle-leaf Acacia, *A. myrtifolia*, 2½ inches in height, and bearing 12 flowers. This, I consider, is almost a floral record for acacias. In June last I brought from the Dandenongs this seedling, which is thriving in its new environment.—A.J.T.



Fig. 1 PTEROSTYLIS ACUMINATA
(Magnified about 2 diam.)

Fig. 2 PTEROSTYLIS ACUMINATA
One Side Cut Away
(Magnified nearly 3 diam.)

Fig. 3 PTEROSTYLIS RUFA
One Side Cut Away
(Magnified about 3 diam.)

Fig. 4 PTEROSTYLIS PUSILLA
(Galea Cut Away)
(Magnified about 3 diam.)

Photos by T. Green

THE FLOWER SHOW.

In spite of the dryness of the past winter and a consequent late season, this year's Flower Show was considered by many to have been the best yet held.

On account of the recent destruction by fire of the Town Hall in Melbourne, that of St. Kilda was chosen for the display of the beauty of our bush, and, in spite of its distance from the chief civic centre, the Show was successful, the attendance being greater than the Committee had dared to expect.

Flowers came from widely-distant places, and Queensland was the only State unrepresented. From Western Australia was sent a fine collection of curious and beautiful species, the most notable being the lovely purple *Platytheca galeoides*, kin to our own lovely *Tetralitheas*, two Kangaroo Paws, *Anigozanthus Manglesii* and *A. humilis*, *Lambertia multiflora*, *Simsia latifolia*, the Blue Tinsel Lily, *Caleclasia cyanea*, *Isopogon rosea*, *Hibbertia stellaris*, *Petrophila linearis*, and many others.

New South Wales supplied its incomparable Waratah, *Telopea speciosissima*, the most regal of all our flowers, the lovely Flannel-flower, *Acinotus Helianthi*, the charming, but badly-named, Native Rose, *Boronia serrulata*, and the fine lance-leaved *Crowea saligna*.

From Broken Hill were the Sweet Quandong, *Fusanus acuminatus*, with grey foliage and attractive bright-red fruits, the glorious Sturt's Desert Pea, *Glianthus Dampieri*, the rare *Cryptandra propinqua*, fine blooms of *Eremophila alternifolia*, the Silver Cassia, *C. artemisioides*, our only blue *Boronia*, *B. cærulescens*, two really handsome salbushes, *Kochia tomentosa* and *Bassia eriacantha*, and several noticeable composites, of which *Helipterum polygalifolia*, the Milk-wort Sunray, and three *Asters*, *Olearia magniflora*, *O. rudis* and *O. pimelioides*, were particularly good.

Of flowers from our own State, about 200 species were staged systematically. The acacias were, perhaps, better

represented than usual by two dozen species, the great majority of them familiar to most of us. The most novel were *A. spinescens*, which describes itself and is obviously from the dry North-West, *A. microcarpa*, the Manna Acacia, *A. collettoides*, Wait-a-while, also armed with defensive spines, the very beautiful *A. buxifolia*, with grey box-like leaves, and the almost equally attractive *A. brachybotrya*, the Silver Mulga, all from the same district. Two others not so uncommon were the Woolly *A. lanigera* and the Narrow-leaf Acacia, *A. linearis*, from Foster. Gippsland furnished more flowers than have come to us in former years from that quarter, and a particularly good lot, of seventy species, from Pakenham was effectively staged. Among these was a fine bunch of *Epacris microphylla*, the Coral Heath. Other Heaths from the east in good form were the Common, the Woolly and the Blunt-leaved.

Tarakale, in the north, yielded the ever-welcome Fairy Wax-flower, *Eriostemon obovatus* and *Tetratheca*, two pretty epacrids, *Leucopogon juniperinus*, the Prickly Beard-heath, not often shown, and *L. cricoides*, the Pink Beard-heath, as well as our best *Grevillea alpina*.

Swainsona procumbens came from further afield.

A good supply of material was sent from the Mallee. Ouyen being responsible for as many as five boxes. Of the many species only a few can be detailed, such as *Pittosporum phylliræoides*, the weeping member of its genus, a handsome specimen of which, by the way, can be seen in the Melbourne General Cemetery, two *Prostantheras*, *P. chlorantha*, the curious Green and *P. aspalathoides*, the Scarlet Mint-bush, the Silvery *Phebalium bullatum*, the Pink Velvet-bush, *Lasianpetalum Behrii*, the very blue Lavender Halganja, *Eutaxia*, the Desert *Cassia eremophila*, the Three-winged Blue-bush, *Kochia triptera*, and several composites, amongst which were the Soft Billy Buttons, *Craspedia pleiocephala*, and the *Olearies pimeleoides*, *rufis*, *ciliata* and *Muelleri*.

Ordinarily we depend greatly on the Grampians for our success, and again there was the customary showing of its floral magnificence. *Thryptomene* (*Mitchelliana*) *calycina*, *Micromyrtus* (*Thryptomene*) *ciliatus*, the Fringed Heath-myrtle, *Ilotzkya*, and Pink Swamp-heath, with the Olive *Grevillea*, the *Boronias*, *B. pinnata* and *B. pilosa*, the Slender *Conosperm*, and many others, the arrangement of which was greatly admired. It is gratifying to find the first-named plant,

the Bushy Heath-myrtle, becoming so popular. Soon no garden will be without a plant, as it is so easily grown. At the Frankston golf links it is sown broadcast, and in one case a thick scrub of it is coming along in most robust fashion.

Undoubtedly the most popular section of our flora is that of the orchids. Quite a number of people are devoting themselves to their study, and they are being photographed quite exhaustively. This year's display was, as ever, the centre of attraction.

Unfortunately the late rains and the early date of the show prevented the exhibition of as many species as on former occasions, but the very best use was made of the scanty supply of blooms. The most interesting were two from Western Australia, *Drukea elastica* and *Calceana nigrita*. The best of our own came from Rushworth, Wonga Park and Nyora, and, generally speaking, all were very well packed for transport. Nine *Pterostylis*, mainly *curta*, *nulans*, *alpina*, *longifolia* and *pedunculata*, dominated the tables, and their green was mainly relieved by the Wax lip, *Glossodia major*, and the Snake Orchid, *Diuris pedunculata*. Only twenty-six species in all were represented, and some of them, like the two *Typeranthus*, *Cyrtostylis*, the Tall Leek-orchid, *Prasophyllum elatum*, the Fringed Helmet orchid, *Corysanthes fimbriata*, the May-fly Orchid, *Acianthus caudatus*, the Brownbeards, *Calochilus Robertsoni*, and the Common Bird-orchid, *Chiloglottis Gurneyi*, could muster only from one to very few blooms. There were very few specimens, too, of the six *Caladenias* present.

The selection of cultivated plants from our own Botanic Gardens took, as before, pride of place at the head of the hall. Many fine flowers were shown, the most noticeable of which were the New South Wales Waratah, *Bauera sessiliflora*, *Grevillea Hookeri*, and *G. Caleyi*, *Chorizema cordatum*, *Brachysema lanceolata* and *Chamaelaucium*, the Geraldton Wax-flower, the last three from Western Australia, *Eriostemon myoporoides*, *Acacia montana*, *A. myrtifolia*, *Pomaderris lanigera* and several *Pultenæas*.

Apparently there were few novelties amongst the Victorian plants sent in; only the above-mentioned *Acacia spinescens* and *Kochia triptera* were noted.

Is there not just a little danger that in time our show may become somewhat monotonous and lose the interest of

some of the public in consequence? Quite a number of our best flowers have never yet been put before city folk. We do not remember to have seen, so far, our own *Telopea*, the *Sassafras*, *Howittia*, *Prostanthera spinosa*, *Pholidia gibbosifolia*, *Humea elegans*, *Eucryphica*, the fine variety *aspera*, and *Hovea longifolia*, from Yarra Junction, nor even *Diplanthea Moræa*, which is common at Lower Ferntree Gully, on our tables. We will have to make a point of securing one or more new things at each show, and draw particular attention to these. Perhaps on some future occasion we might even hold the show in January, and let the people see what beauties the mountains afford.

With *Helichrysum rosmarinifolium* and *H. Stirlingii*, *Grevillea Victorice*, *Bækea crenatifolia*, and *B. Gunniana*, *Boronia algida*, *Bossia foliosa*, *Oxylobiums*, *Prostantheras*, *Celmisia*, the upland form of *Leptospermum lanigerum*, *Veronica nivea*, *Epacrids*, *Gentiana*, *Richea* and *Gaultheria* as a basis, what a fine display we could stage, and this idea seems worth serious consideration.

The following is a list of contributors of flowers, with the localities whence they were gathered:—

NEW SOUTH WALES,

Mr. C. G. Brown, Sydney; Mr. A. Morris, Broken Hill.

SOUTH AUSTRALIA.

Master Colin Jenkins, Keith; Mr. E. H. Ising and Mr. Hann, Adelaide.

WESTERN AUSTRALIA.

Miss L. Hanson and Rev. Ernest Bryant, Bunbury; Mr. Higgins, Perth.

TASMANIA.

Mrs. Walker, Mt. Magnet.

VICTORIA.

Mallee.—Mr. F. Holt, Ouyen.

Northern.—State School; Bush Nursing Centre; Gately children, Dingee; Mr. H. Dorman, Miss Dorothy Dorman, Miss Jean Diss, Mrs. C. Hansford, Miss Amy Hansford, Taradale; Mrs. Rich, Rushworth; Mrs. Brooks, Maldon; Mr. Reeves, Bendigo; Boys of State School, Elphinstone.

North-Eastern.—Miss Warr, Wangaratta; Miss Jeffrey, Molesworth; Mrs. Evans, Lima East; Mrs. J. W. Boucher, Chiltern.

Gippsland.—Mrs. W. F. Dyall, Drouin; Mr. F. Barton, Foster; Miss J. Galbraith, Tyers; Miss Fox, Glengarry; Mr. F. Wilkinson, Drouin; Mr. T. Williams, Drouin; Miss Rositer, Hedley; Mr. R. Penny, Briagolong; Mr. T. Hart, Bairnsdale; Mr. Campbell, Glenaladale; Miss L. Dyall, Garfield; Mr. E. Wisewould, Pakenham.

Southern.—State School, Torquay; Mr. P. Davon, French Island.

South-West.—Mr. C. D'Alton, Grampians; Miss Heal, Stawell; Miss F. Allsop, Dreeite.

Melbourne District.—Mr. and Mrs. V. Miller, Beaconsfield; Mr. G. Higgins, Red Hill; Mr. J. Young, Montrose; Rev. G. Cox, Mornington; Mr. E. F. Hayes, Moranding; Mr. W. Operman, Croydon; Mr. W. Tonge, Eltham; Miss E. Kennedy, Frankston; Mrs. Allan Yeo, Pheasant Creek, Kinglake; State School, Wonga Park (Mr. L. Dyer), Master R. Foubister, Pantom Hill; Miss Nokes, Sandringham; Mrs. Hill, Sandringham; Mrs. E. Coleman, Blackburn; Mr. F. Pitcher, Belgrave; Mr. E. Pescott, Mr. G. Coghill, Mr. J. W. Audas, Mr. St. John, Miss Roberts, of Nyora; Mesdames Daley and Hughes, Frankston; the late Director, W. Laidlaw, of Melbourne Botanic Gardens.

The Committee is indebted, as in former years, to the proprietary of the "Age" for the paper required to cover the tables; to that of the "Argus" for the fine notices which contributed so largely to its success in the way of the attendance; and to the Messrs. Keep Brothers for their kind loan of motor lorry and driver for the carriage of the parcels of flowers, etc.

Notes on the Dryopidæ (Parnidæ).

The genus *Dryops* of Olivier (1791), being one year prior to *Parnus* of Fabricius, gives its name to an interesting family of beetles. They are found in fresh water, attached to submerged sticks or the underside of stones, for which their unusually long and strong claws are especially adapted, but are unable to swim and are very slow in their movements.

They have little anatomical affinity with true Water-beetles (Dytiscidae, Hydrophilidae or Gyrinidae), being more closely related to the Dascillidae. Their larvæ are said to live in damp earth, under stones, and to resemble the larvæ of certain Elateridae. Their affinity with the Dascillidae is also in accord with the habits of certain species of this family.

Mr. A. M. Lea has lately described *Sclerocyphon aquaticus* (Dascillidae), of which he and I found three examples on logs that were submerged in water at Waratah, Tasmania, in company with *Helmis tasmanicus*. These beetles want close looking for, as they are small and often remain still or move very slowly, besides being half-covered by a film of slime. This is probably the reason that they have so eluded our naturalists, though probably many species occur in our rivers and creeks. In 1864 the Rev. R. L. King described nine species belonging to three genera, in the Transactions of the Entomological Society of New South Wales (the precursor of the Linnean Society of N.S.W.). Since then only three species have been added, one each by Grouvelle, Blackburn and Lea. I have some five or six new species, either in the press or in MSS., and should be very glad to receive further specimens for examination from collectors, as well as any observations on the reproduction of any members of the genus. All that I have examined with a Zeiss binocular belong to the genus *Helmis* (formerly *Elmis*), which seems to contain the greater number of our species.

These beetles are able to breathe by carrying with them a film of air attached to the villose clothing of their abdomen; but little, if anything, is known of the life-history of the Australian species. The family is thus classified in Fowler's *Fauna of British India*:—

I. Abdomen with five visible ventral segments.

- i. Anterior coxæ transverse, with distinct trochantus.

Sub-fam.: Dryopinæ.

- ii. Anterior coxæ globular, without trochantus.

Sub-fam.: Helminæ.

II. Abdomen with six or seven visible ventral segments.

Sub-fam.: Psepheninæ.

The last is so far unrecorded from Australia; their larvæ are abundant in the rapids of Niagara.

H. J. CARTER.



In the Proceedings of the Linnean Society of N.S.W., Vol. 1, 1925, pp. 299-310; the Rev. H. M. R. Rupp comments interestingly on his collection of thirty-two *Pterostylis*, giving ten good figures in the text, amongst which are those of *Pt. furcata* and *falcata*, *decurva* and *squamata*, *rufa*, *Mitchelli* and *vittata*. In the same journal Dr. E. C. Chisholm gives a fine account of the flora of the Comboyne Plateau, with map, and a list of the plants growing there.

Another *Callistemon*, or another name which will probably have to be added to the list of Victorian plants, is *C. pallidus*, Sm., which Mr. Edwin Cheel would dissociate from *C. salignus*, Sm. Though it resembles the latter in general appearance, its branches are less drooping, its young leaves are clothed in silvery, not rufous, hairs, and at maturity are pallid green, or somewhat glaucous, terminate in a sharp *micro*, and are thicker in texture, with less prominent venation. Forms of this species have been obtained at elevations above 2000 feet in N.S.W. and Victoria, and the Buffalo Range (F. v. Mueller, 1856) and Granite Hill, Wilson's Promontory (J. W. Audax, 1908) are given as localities in this State.

A new species, *C. Chisholmi*, from North Queensland, is also described by Mr. Cheel in this number, which has much interest to botanists. This has blood-red filaments and anthers, and grows into a small tree.

In speaking of *C. subulatus*, a comparatively recent addition to our flora, found by Mr. H. B. Williamson at Tonghi Creek, Mr. Cheel describes it as somewhat like our alpine *C. Sieberi*, the leaves being narrow and sharp. The filaments and anthers are richly crimson, and, in his opinion, it really has closer affinity to *C. lanceolatus*, from which, however, it differs in its crowded fruits and its smaller, thicker, grey leaves. It is found in many places in New South Wales.

Mr. Cheel describes a new species of *Boronia* in the *Journal and Proceedings of the Royal Society of New South Wales* for 1924. This, *B. saefrolifera*, is from the coastal district of N.S.W., north of Sydney, and superficially resembles *B. floribunda* and *B. pinnata*.

He also discusses the latter; and some of the many forms which Mueller included in what was, to him, a very polymorphic species. Mr. Cheel regards all of these as well-marked species, and even goes further in declaring, after examining specimens collected by the Baron on the Bunyip Creek, and by Mr. P. R. H. St. John at Labertouche—the variety *Muelleri* of Bentham—that they are distinct from the *B. pinnata*, Sm., common in the Port Jackson district. Beyond pointing out that the oil of *B. Muelleri* has a pleasant fragrance, whereas that of *B. pinnata* is unpleasantly acrid, he does not describe the differences between the two plants.

As the result of his researches in the genus *Metaleuca*, Mr. Cheel recognises *M. erubescens*, Otto (N.S.W.), *M. Gunniana*, Schauer (Tas., Bass Strait and Vic.) and *M. ternifolia*, F. v. M. (N.S.W.), all formerly included in *M. ericifolia*, Sm., as distinct species.

From material derived from Lord Howe Island, and so far regarded as *M. ericifolia*, he creates *M. Howeana*, and a plant of N.S.W., with larger yellow flowers, not concave leaves, akin to *M. squamea*, he describes as *M. capitata*. He also distinguishes a new variety, *glabra*, of *M. squamea*. In addition he raises the variety *alternifolia*, Maiden and Belche, of *M. linearifolia*, ranging from N.S.W. to Queensland, to specific rank.

The item in his paper which is of more particular interest to us is *M. Gunniana*, specimens of which, in the Sydney Herbarium, from the Upper Yarra, Port Phillip, Mordialloc, Metunga and Narrowarren, are, in Mr. Cheel's opinion, distinct from *M. ericifolia*, Sm., with which they have been previously confused.

A matter worth mentioning also in this *Journal* is the description by de Benzeville and Welch of a new *Eucalyptus* from the main divide at an elevation of 4000 feet, near Cooma, in N.S.W. This *E. Badjensis* is a large forest tree of 100 feet or more, known locally as "Gully Ash." It resembles *E. viminalis*, with which it is associated, but differs mainly in its smaller, conical, sessile fruits, which are, however,

arranged in the cruciform fashion so characteristic of that species, and its narrower and duller green leaves.

The finding of *Pultenau graveolens*, Tate, at Steiglitz, on the occasion of the Club excursion to the Brisbane Ranges on October 3, clears up the doubt that existed as to the exact habitat of the plant in this State.

In 1885 specimens were sent to the National Herbarium by Mr. S. Johnson, of Meredith. These were found by Mr. H. B. Williamson, when engaged in the revision of the genus, in the parcel containing *P. mollis*, where they had been placed by the late Baron von Mueller. Several plants were noted on a rocky, sterile hillside near the almost-deserted township of Steiglitz, in the low, open forest of red iron-bark, yellow gum, red stringybark, messmate, and red box. There was very little undergrowth, the ground being almost devoid of vegetation over quite large areas. The *Pultenau* is an unattractive, unkempt-looking bush about three or four feet high, with downy stems and foliage of small, narrow, incurved leaves, and was still in bud. When crushed, the leaves yield an aroma which is certainly not unpleasant—and so it belies its name—but is difficult to describe, though Mr. I. M. Black finds in it a resemblance to cream cheese.

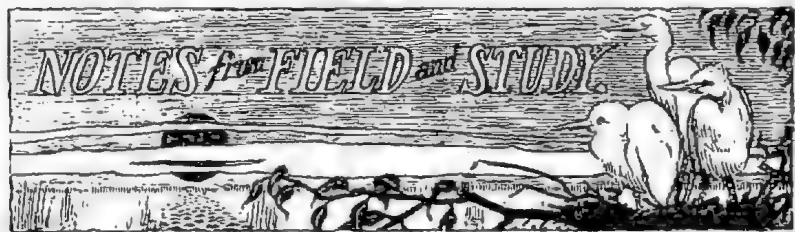
From the nature of the country around Meredith, it is certain Mr. Johnson did not collect the plant near that place, but most probably from where it was found by us.

THE "Rufa Group" OF GREENHOODS.

The group of Greenhoods, known as the "rufa group" of *Pterostylis*, which does not include the Banded Greenhood, *P. villata*, has given rise to much confusion among collectors, as, superficially, the species are much alike. All are reddish or greenish-reddish in colour. One only of the group is described by Baron von Mueller, in his key, at page 419, but Dr. R. S. Rogers' research has credited at least four in Victoria—the Ruddy-hood, the Rusty-hood, the Sealy Greenhood and the Mitchell Greenhood. These are fully described by Dr. Rogers, on page 153 of Mr. J. M. Black's *Flora of South Australia*, 1922, as *P. pusilla*, *P. rufa*, *P. squamata* and *P. Mitchellii*.

The photographs (Plate V) show portions of the flowers cut away so as to display the marked differences between *P. rufa* and *P. pusilla*. *P. rufa* usually is a tall species the lower part of the flower ending in long thread-like tails. The tongue is thinner than in *P. pusilla*, with longer hairs on the margins and with usually two very long hairs at the base. *P. pusilla* is richly coloured in shadings of brown, green and red. It is usually slender and somewhat dwarf. The tongue (labellum) is flesh-like, with a few front marginal hairs.

In one photograph the Pointed Greenhood, *P. acuminata*, is shown intact; in another, the same flower with one side of the hood removed. This orchid has sometimes been thought to be a hybrid between the Nodding Greenhood and the Blunt Greenhood, *P. nutans* and *P. curta*, and was so collected by the writer of these notes, at Mordialloc, in August, 1910. However, last year Mr. W. H. Nicholls submitted the specimen photographed to Dr. Rogers, who fully established its identity. Mr. Nicholls is well known to members of the Club as a keen worker on Victorian orchids, who has delineated much detail accurately and naturally for, let us hope, a forthcoming book.—A.J.T.



"BEES' WINTER HARVEST."

Mr. J. A. Ross, Nanacella Estate, via Rochester, writes:— 'Re "Bees' Winter Harvest," in September issue. The secretion of nectar by the glands on the phyllodes of the Golden Wattle was mentioned some considerable time ago in a couple of the Apicultural Journals, and is not unknown to bee-keepers. As with all other nectar-producing plants, the amount of secretion seems dependent on climatic conditions. In seasons when conditions have been, and are, suitable, I have noted the bees 'roaring a treat' in Golden Wattles well isolated from any other trees or nectar-producing plants—

working the glands ravenously; and this some time before the first flower on the trees had opened. How the bees find it I know not, but it seems a lure spread for them and other pollinating insects to give a chance of fertilisation to the earliest opening flowers. Once the trees start flowering the secretion from the glands seems to cease. This is a point I have not previously seen noted. Perhaps these glands would have made a good illustration for Darwin."

"WINNING" WILD BIRDS.

During the past three years, while living at Pakenham Upper, I have been impressed by the tameness of bush birds, when not hunted or otherwise molested. In my garden and orchard is a friendly feathered company. In a pine tree, 15 paces from the back door of the house, a pair of Magpies, *Gymnorhina hypoleuca*, are nesting now (September). The birds do not attack us; indeed, do not take any notice when we pass the tree. For several years these magpies, or their progenitors, have frequented the garden, nesting in trees beyond the fences, and bringing their broods about the house for food. This year they and their friends have come "home" to nest.

Butcher-birds, *Cracticus torquatus*, and Magpie-larks, *Grallina cyanoleuca*, come to the tin plate placed at the back door with food for the house dog, and take any scraps that he may leave. The Butcher-bird has developed a liking for fruit luncheons. One has been observed frequently taking mulberries. At times the *Grallinas* drink milk from the cat's saucer, right at the door. Last year, and this season the Butcher-birds built in an acacia growing by the orchard fence. They are so friendly that they perch on the rose and dublia stakes, close to her, as soon as my wife appears in the flower garden; and, as she walks around, hoeing or weeding, they follow. They hop near her hands, or on to the hoe, and pick up grubs that are unearthed.

The Kookaburras, *Dacelo gigas*, for several years in succession, have nested close to the house, bringing their young to us as soon as they could fly. We have sometimes seven or eight Kookaburras in the garden at one time. One pair, the grand-parents no doubt, follow us around. If a grub is in sight, and not offered to them, they will fly down, right

beside us, to secure it. Both these old birds will take grubs from our hands. The male is so confiding that, if I hold a grub on the palm of my hand, out of reach from his perch on a bough, he will fly on to my arm and take the morsel.

The confidence of small birds, also, has been won. Grey Fantails, *Rhipidura flabellifera*, at times enter the house through doorway or window, and capture flies. Without the least sign of fear, they will perch on one's head or shoulder. Nor are any of our bird-friends alarmed when we shoot at the parrots eating buds off the almond and other fruit trees. They seem to know that the shots are not meant for them. We have three species of parrots in our territory. It is worthy of note that the beautiful King Parrot, *Aprosmictus scapularis*, has been present in numbers this year.—F. WISEWOLD.

SUBSCRIPTION RATES AND RULES.

Attention is directed to the following list of rates and extracts from the rules relating to subscriptions:—

Ordinary members, with Journal	20/-
Ordinary members, without Journal (where more than one in a household)	10/-
Country members, with Journal (residing outside 15-mile Melbourne radius)	12/6
Associate members (over 16 and under 20), with Journal)	7/6
Associate members (over 16 and under 20), without Journal)	5/-

5. All subscriptions shall become due on the first day of May in each year.

6. no person who has been elected shall be entitled to the privileges of a member until his subscription shall have been paid, or while his subscription is in arrears.

7. Persons elected after the 1st November shall be entitled to the privileges of membership on payment of half the annual subscription.

The Victorian Naturalist

VOL. XLII—No. 7

NOVEMBER 6, 1925

No. 503

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, October 12, 1925. The President, Mr. Geo. Coghill, occupied the chair, and about fifty members and friends were present.

REPORTS.

Heidelberg, Sept. 19.—Mr. J. Stickland reported that a small party of members spent a pleasant afternoon around the ponds, but nothing of note was collected.

Ringwood, Sept. 26.—Ten members attended this excursion. Several good "finds" were made, the most interesting, perhaps, being a colony of Termites. When a large piece of bark on an old stump was stripped off, the Termites were revealed, running up and down in files; very few failed to keep in the narrow tracks. Another stump contained a nest of the Wood-ant, *Iridomyrmex nitidus*, the ants with the peculiar sweet odour of which cats seem so fond. Everyone agreed that the odour was of a decidedly sweet nature, but not one that cats would be expected to like.—C. OKE.

Brisbane Ranges, Oct. 3.

Bendigo, Oct. 10.

(Reports appear elsewhere in this issue.)

GENERAL.

Sale of Native Flowers.—Mr. E. E. Pescott said that, as requested by the Committee, he had made enquiries regarding the granting of permits for gathering flowers in the Grampians. A member of the Forestry Commission had told him that no damage was being done, as the area in regard to which permits had been granted was far from the Wild-flower Garden, and seldom, if ever, visited by tourists. The Tourist Bureau and the Railway Department had each sent an officer to inspect the area, and they had reported that no damage was being done.

Destruction of Fairy Wax-flower at Bendigo.—After some discussion as to what steps could be taken to protect the Wax-flower at Bendigo, on the motion of Mr. A. E. Keep, seconded by Mr. F. G. A. Barnard, it was resolved that the Hon. Secretary should write to the Mayor of Bendigo calling attention to the destruction of the plants, and asking whether anything could be done to protect them and prevent the sale of blossom on Picnic Day.

PAPER.

"Two Weeks at Bethanga," by Mr. A. E. Rodda. The author gave some account of the country around Bethanga, and the fauna met with during a recent visit.

EXHIBITS.

By Mr. Geo. Coghill: Plants grown at Canterbury, *Leptospermum laevigatum*, *Micromyrtus ciliatus*, *Grevillea rosmarinifolia*, *Tecoma australis* and *Daviesia latifolia*.

By Mr. F. Chapman, A.L.S.: Original drawings of fossil Foraminifera, from the tertiary (Balcombian) beds of Port Phillip; to illustrate a paper shortly to be published by F. Chapman and W. J. Parr.

By Miss C. C. Currie: Two eggs of the Gippsland Giant Earthworm.

By Mr. J. E. Dixon: 72 species of Coleoptera collected in the Lake Hattah district, N.W. Victoria, during September.

By Mr. I. Hodgson: Seven species of native flowers from the Whipstick Scrub, at Bendigo, *Eriostemon obovatis*, *Baekea diffusa*, *Baekea ramosissima*, *Calytrix tetragona*, *Daviesia ulicina*, *Olearia asterotricha* and *Grevillea alpina*.

By Mr. J. A. Kershaw: *Octopus bosei* ♂, collected at Port Melbourne, 29/5/5.

By Miss F. Smith: *Sarcochilus falcatus*, from Cann River district, Victoria.

By Dr. C. S. Sutton: *Pultenaea graveolens*, *Prostanthera decussata*, *Grevillea floribunda*, *Pomaderris ferruginea*, etc., from Brisbane Ranges; also *Ruppia maritima*, from Little River.

By Mr. H. B. Williamson, F.L.S.: *Acacia doratoxylon*, *Pultenaea styphelioides*, *Helipterum incanum*, *Dillwynia ericifolia*, and a dried specimen of the Narrow-billed Bronze Cuckoo, from Chiltern, N.E. Victoria.

EXCURSION TO THE BRISBANE RANGES.

For the excursion to the Brisbane Ranges on October 3 and 4 two members took train to Lara, where they were joined by the Rev. Mr. Gates, who very kindly motored them to Anakie. Before leaving Lara, however, a short visit was paid to the railway line towards Little River. Here the reserve was unusually gay with flowers, amongst them many Composites and Pimeleas, *Velleya paradoxa*, and in particular *Prasophyllum Odoratum* and *Thelymitra aristata*. Time did not permit going further on to where the Black Brittle-rush, *Chorizandra enodis*, had been discovered by Mr. Gates—the only locality so far known for this plant in the southern district.

Arrived at Anakie, the car was left at the foot of the range, and after going along the Anakie-Durridwarrah road for a short distance the first track to Steiglitz was followed. From this point to a little short of Steiglitz the substratum is composed of sand and gravel, and the same plant association continues throughout, with occasional slight variation.

The tree growth is composed mainly of Red Stringybark, Messmate, Yellow Gum and Long-leaf Box, and, not infrequently, Red Box, Red Ironbark and Common Peppermint, with an occasional Black Sheoke. *Xanthorrhœa australis* and *Hibbertia stricta* stood out beyond all other plants of smaller size, both in frequency and continuance, and the Golden Wattle was also persistent and abundant. Except the Hedge Acacia only one other made much of a show, and this, *A. pycnantha*, though just past its best, was still a glorious sight. There are half-a-dozen Grevilleas in the Ranges, and the finest of these, *G. floribunda*, the golden, was never quite out of the picture. *G. rosmarinifolia* and *G. aquifolium*, the prickly, were also seen, the latter not yet in flower.

Five epacrids were noted, but they were not conspicuous. The Common Heath was here *not* very common, but Mr. Gates, who returned from Steiglitz the same day by the more northern track, noted an abundance of it on the way, show-

ing particularly fine colour, from the palest to the deepest pink. The Peach Heath was very good, as was also the Common Beard-heath. *Monotoca scoparia* and *Aerotrache serrulata* were, of course, not in flower. The only myrtaceous plants seen, apart from the gums, were *Leptospermum scoparium* and *L. myrsinoides*, which would be more conspicuous at a later date.

Two isolated patches of *Eriostemon obovatus*, neither very extensive, were encountered, but the plants are neither so robust nor so floriferous as those in the Bendigo district. Of the leguminous species, only *Pultenaea daphnoides* and *Dillwynia ericifolia* were in full bloom. *D. floribunda* was only commencing to show the beautiful colour which distinguishes it in this locality; *Gompholobium*, *Daviesia corymbosa* and *Pultenaea humilis*, all abundant in the Ranges, were still in bud. It is interesting to record that the Hop Bitter-pea is quite rare hereabouts.

Of the orchids only *Glossodia major* and *Caladenia caerulea* were numerous, *Pterostylis nutans* and *P. nana* were discovered in one spot only, growing in company. Occasional Pink Fingers and a few Leopard Orchids completed their list. The Liliaceae were not much in evidence. *Bartlingia sessiliflora* was a notable find for the locality. *Dianella revoluta* was yet to flower. Only the appealing and ever-charming Early Nancy fully represented the family.

About Steiglitz the Ordovician comes to the surface, and there is much bare ground between the gums. Here the Yellow Box appeared for the first time. Red Ironbarks were more frequent, and along Sutherland's Creek Manna and Swamp Gums were present. Here, too, by the kindness of Mr. Cooper, a local resident, who is well acquainted with all the plants and their virtues, we were introduced to what was the most important plant noted during the outing—*Pultenaea graveolens*. Unfortunately it was still in bud, but Mr. Cooper promised to send flowering specimens and seedlings to town, so that eventually this rare species may perhaps be seen flourishing in the Botanic Gardens.

Though there is a delicensed hotel in Steiglitz it does not afford accommodation to visitors, but lodging was found in a deserted house, where, with the aid of a good fire, and some chaff bags, a comfortable night was passed. On Monday morning Mr. Cooper, after showing us, amongst other interesting things, a fine specimen of *Aletris pinnosa* growing in his

garden, a bush of *Pomaderris ferruginea* in full bloom near the creek, and a valiant pear tree which, though ring-barked most thoroughly, was still flourishing and making an effort to bridge the gap in its stem with new bark, was good enough to pilot us across country to the Meredith road.

From here on to the Moorabool the vegetation did not invite excursions from the road. There was very little undergrowth, and nothing that had not previously been noted was seen. *Acacia tenuifolia* here took pride of place in its genus, though *A. pycnantha* still occurred, and some fine mats of it, covered with golden blossoms, were particularly admirable. Cushions of the Green Ground-herry were also more frequent, and small stoneworts, minute pennyworts, porantheras and millotias scantily covered the sterile ground, and were only distinguishable on close scrutiny. After a time the Grass Trees reappeared, and with them a slight increase in the number of species, but this did not last long, and the descent to the river was only broken by a pause to collect again *Pomaderris ferruginea* by the roadside.

At the Moorabool the Black Wattle, Woolly Tea-tree, Swamp Bottle-brush and Burgan, *Kunzea peduncularis*, had not yet responded to the, as yet, frigid advances of Spring, and the billy was boiled and a frugal lunch eaten without floral distractions.

Beyond the river the vegetation continued to be uninteresting, and a wide detour on each side of the road, just before the termination of the forest, resulted in the discovery of nothing more notable than a recurrence of the *Kunzea*.

Thereafter the only matter leading to a diversion from the highway was the appearance of a wide expanse of flat, wet ground, covered with a low, close growth, of a reddish colour, which on examination was taken to be *Plantago corniopus*, practically unmixed with any other species and stunted by the sourness of the soil.—C.S.S.

The Butterfly Flag, *Diplarrhena Mowen*, is not found nearer to town than about Lower Ferntree Gully. At Upper Pakenham it is quite common, and, previous to our latest Show, at the date of which it was not yet in bloom, it has figured for the last six years in Mr. Wisewould's exhibits from that place.

EXCURSION TO BENDIGO

Six members journeyed to Bendigo on Saturday, October 10, and proceeded to the ranges to the south of the city. Here, in some parts, the bush was gay with the Fairy Wax flower, *Eriostemon obovatus*. Pink-eyes, *Tetratheca ciliata*, were brilliant in purple colouring, and the golden blooms of *Acacia pycnantha*, *A. armata*, *A. diffusa*, and *A. aspera*, made a pleasing contrast. The Native Indigo, *Indigofera australis*, and the Gorse Bitter-pea, *Daviesia ulicina*, were in full bloom, as also were the Daphne Heath, *Brachyloma daphnoides*. The ranges were very dry, and moisture-loving plants were few. The only orchids seen were the Wax-lip, *Glossodia major*, fairly numerous, and solitary specimens of Pink Fingers, *Caladenia carnea*, and Brown-beards, *Calochilus Robertsonii*, the Currant-Bush, *Leptomeria apophylla*, was in fruit. After an enjoyable ramble amid the Wax-flower undergrowth, One-tree Hill was reached, whence a wide-spread view of plains, undulating country, and ranges was obtained. Then the course was made westward through the Ironbark ranges, amid a profusion of wild-flowers to the Spring Gully Reservoir, thence back to the city.

On Sunday a visit was made to Flagstaff Hill, about seven miles past Eaglehawk, in the Whipstick Scrub. The country here was also very dry, and floral wealth not so evident as on the occasion of a previous visit. The scrub consisted mostly of Green Mallee, *Eucalyptus viridis*, and Melaleucas, the Broom Honey-myrtle, *M. uncinata*, the Cross-leaf, *M. decussata*, and the Crimson, *M. Wilsonii*. Here and there amid the scrub was a fine variety of flowers. Most noticeable were the pretty *Micromyrtus microphylla*; the dainty *Baeckea tomentosissima*; the pungently-scented *Boronia caudonifolia*, just past its bloom; the purple *Prostanthera hirtula*; Grevillias, varying in colour from white to red; *Olearia teretifolia*; the rare *Westringia rigida*; and *Astrotricha ledifolia*. The Wax-flower does not grow robustly in the Whipstick. The Common Fringe Myrtle, *Calythrix tetragona*, was in bud and flower in great quantity. The blue *Dampiera lanceolata* was also in flower, with several Composites, Hibbertias and Goodenias. Nearly sixty plants

in all were observed in flower, but no plants previously unlisted were noted. The Leafless Currant-bush was in fruit; and the troublesome parasite, *Cassytha melantha*, with strangling grip on scrub and tree, was in flower and fruit. Before returning to the city we inspected in operation a plant for the distillation of oil from the leaves and young branches of the Green Mallee, *E. viridis*. A point very noticeable about the old alluvial workings on the mining areas is the widespread growth of the Chinese Scrub, *Cassinia arcuata*, to the exclusion of other growth. The Fairy Wax-flower has a general popularity, the evidence of which is shown by the wholesale manner in which it is gathered for sale at Bendigo and at the railway stations en route, especially at Elphinstone. Continuance of this will eventually lead to its disappearance in some areas.

THE "STICK-FAST" FLEA IN NORTHERN TERRITORY.

The "Stick-fast" Flea, *Echadnophaga gullinocen*, Westwood, known in Western Australia since 1914 and more recently from South Australia, now appears to have become established in the Northern Territory, where it has been found recently on aborigines' dogs in the vicinity of Cape Don Lighthouse. In a communication, forwarded with specimens, Mr. Hugh W. Christie, until recently head lighthouse-keeper at Cape Don, stated that the pest had appeared only recently. The locality is about 100 miles north-east of Port Darwin, where Mr. Christie has had over 20 years' experience in charge of the Lighthouse at Cape Charles, and is inhabited only by the lighthouse staff and their families and a few aborigines. Whence the fleas came cannot be stated, but whilst it is possible they were introduced from Western Australia, it may be recalled that some of our worst pests have almost certainly obtained their foothold in Australia from direct importations into the Northern Territory from the East. The fact that dogs belonging to nomad aborigines are heavily infested suggests ready means of wide distribution. "Ferguson, Aust. Zool. III, pt. III, 1923.—By G. F. HILL, Entomologist, National Museum, Melbourne.

[For illustration and note of this flea, see *Vic. Nat.*, vol. XL (October, 1923), p. 119.]

A NATURALIST AT BETHANGA.

By A. E. RONNA

*(Read before the Field Naturalists' Club of Victoria,
September 14, 1935)*

The object of this paper is to record some observations made during a fortnight's visit, in February and March last, to Bethanga—a district that combines much natural beauty with opportunities of observation not generally met with on this side of the Dividing Range.

The journey occupies the total length of the North-Eastern railway line to Wodonga, and then a distance of nine miles along the Cudgewa line, as far as Ebdon. Leaving Wodonga, the line soon passes into hilly country, sparsely timbered, except on the higher ranges further back. The narrow valley of the Kiewa River, with its attendant billabongs (a characteristic feature of the rivers of this country), is crossed on a long bridge. Two small stations, Bandyanna and Bonegilla, are name only, no signs of habitation being visible, and, as names, are relieved from absurdity by their obvious aboriginal origin. They are passed without stopping.

The next station is Ebdon, which has at least four buildings, including the railway station. Here the train is left for a five-mile drive on a gravelly road to Bethanga. The road is of the switchback type—up hill and down dale—with a level stretch of a mile across the valley of the Mitta Mitta and its many billabongs. Beyond is a narrow valley, down which flows the Bethanga Creek, a very small stream, considering the area it drains. Another mile or so of switchback and the valley widens out to disclose the village of Bethanga nestling at the head of it. All around are high, bare hills, topped, in some cases, with large, pinkish boulders of gneissose schist, and pierced by long gullies, each with its trickle of water contributing to the main creek. What timber ever grew on these hills has long since been removed for the requirements of the mines, evidences of which still remain in the form of mouldering poppet legs, tall and

crumbling brick chimney stacks, and great heaps of brown unblock.

These hills, surrounding the village, were, at this season, covered with a thick mat of grass; they form a grazing common for large numbers of cows, on the products of which the inhabitants live, as there is no cultivation, excepting a few small patches of lucerne in the gullies. Practically the only trees remaining on the hillsides in the vicinity of the village are a few Currajongs, *Brachychiton populneus*, which serve as a small reserve of emergency fodder in the dry season. The currajong is considered locally as the indestructable tree. The specimens in question have been lopped to the bare branches time and again, and still put forth a mass of succulent foliage, which is all the denser on account of rigorous pruning. The soil of the valley is very deep and in places where the creek has cut through to bed rock, the section shows over twenty feet of gravelly soil.

Bethanga, sharing the fate of many mining townships, can now be designated as "of the past." At one time it was the scene of much activity, but the auriferous ore is of a refractory nature and could not be treated by battery process; necessitated a large roasting and smelting plant which remains now in practically the same condition as when in use, save for the ravages of time. Below the works, on the creek bank, are great dumps of purple sand from the pyrites roasters, now tunnelled in all directions by rabbits. Close by are large heaps of iridescent slag from the smelters, many great lumps still retaining the clinical shape of the large cast-iron wheel-ladles. Where the creek skirts the slag-heaps, the copper solutions draining into it have precipitated a beautiful blue-green carbonate, which coats all objects beneath the clear water. So highly mineralised is the water of the creek that it is considered unfit for human consumption, although stock seem to relish it. The paddocks of ore stacked about the works, and sparkling with copper and arsenical pyrite, are destined, perhaps, never to be treated. The pyrite is slowly decomposing in the weather and forming white crusts of arsenious oxide.

The walls of the machinery-houses are dotted with what appear to be bobs of clay, thrown up by mischievous boys, but are really the nests of mud-building wasps, or "hornets," as they are locally called. These nests consist of elongated cells of clay placed side by side, and are packed with comatose or defunct spiders, among which unsavoury surroundings

lives and feeds the yellow larva. The clay cells, when just completed, are beautiful examples of insect architecture, but are soon plastered over with irregular pellets in a mound-shaped mass. Hanging from the rafters are other elegant examples of insect industry, in the form of the honeycomb homes of paper wasps, well guarded by their vicious owners.

On the hillsides, wherever the rocks outcrop, is found the common Rock Fern, *Cheilanthes tenuifolia*, and the Docklace Fern, *Asplenium flabellifolium*. These, with several small patches of Bracken, which does not seem to thrive in this soil, are the only ferns common in the district. In the mouths of several of the old mining tunnels, Fairy Martins, *Petrochelidon ariel*, have nested freely, but the nests have all been destroyed by boys. The birds were flying in and out, and it was found that they had profited by their unfortunate experience, and had nested further back, in almost complete darkness, where the small boys dare not venture. Even thus late in the season, broods were being reared. Among the Martins' nests were several empty nests of the Welcome Swallow, *Chelidon neozina*.

Other inhabitants of these tunnels were bats and an owl, both of which retreated to the darker depths while the disturbed swallows sought the open air. Possibly foxes also dwell there, as several were heard barking on the hillsides in the evenings. Among the outcropping rocks rabbits have their burrows, and into impregnable cracks in the larger boulders skink lizards of the *Ugernia* family insinuate themselves—they can be removed only in pieces.

Following the winding gully-road up past the old mines, a low saddle of the range is reached at a place, of course, called "The Gap." From here a magnificent panorama of the Murray Valley is opened up. The noble river winds about amid a perfect maze of billabongs, through a fertile valley dotted with magnificent red gums, *Eucalyptus rostrata*. To the west can be seen the towns of Albury and Wodonga, and straight across, only four miles away, are the great quarries and earthworks of the Hume Weir. This, when completed, is destined to turn the whole of the valley in sight, and also that of the Mitta, into a vast expanse of wealth-giving water. The twin townships of the workers, one on either bank of the river, present an orderly array of neat frame-houses, fronted by lawns and gardens, and laid out into regular, tree-planted streets. Schools, shops, and recreation halls are provided with cheap electric light, and

an unlimited water supply. Beyond the Murray Valley rise range after range of lightly-timbered hills, on the New South Wales side; and, looking back into Victoria, an even more bewildering array of mountain peaks is seen, culminating in the dim blue heights of the Australian Alps.

A drive up the Murray Valley, via Talgarno, and skirting the river most of the way, was enjoyed. Coming down from the hills, the undulating country becomes thinly-timbered with well-grown trees, mostly a species of box, with its characteristic greyish foliage of round leaves, and a few stringy-barks and peppermints. Near Talgarno a small paddock, close to the road, contained six ostriches. On the river-flats are magnificent red gums, stately in bole and wide-spreading in branch. Here is the bird-lover's paradise. *Rusellas*, *Platycercus eximius*, lorikeets, *Glossopsittacus caninus*, and the dainty little red-backed parakeet, *Psophodes haemalonotus*, fly screaming from tree to tree, and grass parrots are flushed in pairs from the coarse tussocks. The usual dozen of grey-crowned babblers, *Pomatornis superciliosus*, leap excitedly among the branches of a wattle tree, and a company of white-winged choughs, *Corcorax melanorhamphus*, take flight, with mournful, though melodious, flute-like whistles. In flight they show the white wing patches that mainly distinguish them from their sable cousins, the crows and ravens, cawing raucously overhead. On a bare hillside a small flock of rose-breasted gulahs, *Cacatua roseicapilla*, comes to rest, and a few white cockatoos, *C. galerita*, are screaming amid the timber higher up. There are many small birds about on the flats. Tree-creepers, *Climacteris*, of two kinds seemingly defy the laws of gravity by making impossible-looking hops up vertical tree-trunks, and red-browed finches, *Aegintha temporalis*, are busy among the *Bursaria* bushes, where some of their ungainly nests still remain.

In places the foothills come steeply down to the river or its billabongs, and the road passes through them in sidling cuttings. Magnificent lagoons some of these billabongs are: wide, still, and deep, bordered on one side with the pink granitic rocks of the hillside, and on the other with dense beds of reeds and bulrushes. On the placid waters float teal, *Pirago gibberifrons*, and black duck. *Anas superciliosa*, but not many, as, although the season is not yet open, the guns have been busy among them for weeks past. Where the water shallows, it is thickly covered with aquatic vege-

tation, among which water-birds of several species prospect busily, taking little notice of passing vehicles. Stop the buggy, however, and descend, and instantly every bird scuttles, with loud splashings, over the lily-pads to the shelter of the reed-beds. Smaller waterholes, that are drying up, are tenanted by herons of four species, and their kindred. Among the birds noted here were the yellow-billed spoonbill, *Platibis flavipes*, white ibis, *Ibis molucca*, and egret, *Garzetta nigripes*.

Looking up the gullies, down which flow feeble streams over coarse granite gravel, one is struck by the lack of undergrowth and other vegetation generally characteristic of mountain creeks. Only grass and thistle-beds clothe their banks. Towards the heads of the gullies the timber becomes thicker, and the bright foliage of the currajongs and wattles relieves the prevailing sombreness of the eucalypts. From an outcrop of rock, a large lace lizard raced across the road to a dead tree. Only one snake was seen, and that a large black one, on the flat; it promptly disappeared down a deep and impregnable hole in the river-bank.

Leaving the main road and crossing the flat, an enormous lagoon, almost a lake, choked with aquatic vegetation, was passed. This was the haunt of half-a-dozen pelicans, *Pelecanus conspicillatus*, which, with the cormorants, must find good fishing in the shallow open water spaces amid the rushes. Of the cormorants *Phalacrocorax carbo* was the more common. On another pool a flock of eleven black swans, *Chenopsis atrata*, circled uneasily when approached, and took reluctant flight towards the river.

Our destination was a farmhouse on the river-bank. This place, together with several others passed on the way, is destined to be inundated to the roof-tree when the great weir, a dozen miles down stream, is completed. The farmer, however, is a philosopher. "Time enough to think about that in six years' time," he says.

Rabbit-trapping is a profitable sideline on this farm, and we did a night round with the trapper. The air is perfectly still and no sound was heard save the swish of feet through the long grass, the occasional cry of a night bird, or the distant yapping of a fox on the hillside. Rabbits rarely make any noise in the traps after the first struggle, but the trapper seemed to have no difficulty in finding all his sixty or seventy traps scattered over a considerable area. When

taken out of the traps, the rabbits were killed and the gins carefully re-set. The bodies, with the cars attached, were left for the foxes, eagles, and crows. Foxes, in the experience of our trapper, rarely touched trapped rabbits, but not infrequently are caught in the traps, which they will pull up and carry away for a considerable distance, but can always be found by the keen-nosed dog. Eagles, on the other hand, will destroy the rabbits, and are given scant mercy by the trapper, who sometimes carries a light rifle on his day rounds.

Several days were spent on fishing trips, chiefly to the Mitta. As the rivers were running strongly and were full of snags, it was more comfortable and profitable to fish in the billabongs, which, in themselves, were sluggish streams, being fed by small creeks and springs from the near-by hillsides. English perch, carp, catfish, Murray perch, Murray cod and tortoises, numerically in that order, were taken. True, tortoises are not fishes, but they take any kind of natural bait. They were the short-necked, or Murray tortoise, *Emydura macquarie*. The tortoise is a very shy reptile, and usually shows no more of itself than the tip of a sharp-pointed nose, and a pale yellow eye protruding above the surface of the water. When it thinks it is observed, it makes a backward stroke with its webbed feet, and disappears, leaving scarcely a ripple. During warm weather it will sometimes bask on a log above the water, but always remains wide awake and ready to slip in sideways, or either end foremost, whichever is most convenient. There were plenty of tortoises in the Mitta lagoons, but only two were caught.

While fishing in the billabongs, one is able, between fish-bites, to admire the beauty of the deep, placid water, fringed with aquatic growths of great variety, or, passing from one to another, to observe the abundant bird life. Herons, ibises, and cormorants continually pass overhead, and occasionally a flight of Teal or Black Duck dashes past on whistling wings, or alights with a loud splash, to rise again in panic on discovering the too close proximity of man. On one reedy pool was a mother duck and a brood of six flappers. The parents splashed away, simulating a broken wing; the young ones dived and, apparently, did not come up again, though one knew that they had quietly risen within the shelter of the reeds.

In the great gums the Leatherheads or Friar Birds, *Tropidophynchus corniculatus*, uttered their queer jargon of notes for which the children name them "chinkies" or "chow birds." Magpie-larks, *Grallina picata*, were everywhere, and their mud nests were visible in almost every tree near the water. Hawks of several kinds soared above the trees. The shrill, laughing call of the Brown Hawk, *Neracidea orientalis*, was frequently heard above the shriller notes of the Kestrel, *Cerchneis conchroides*. Among the branches of dead trees on the hillsides glided Rainbow Birds, *Merops ornatus*, and Wood-swallows.

Hordes of starlings, which at this time of the year go in large flocks, come from all quarters to roost in the reed-beds. They circle and wheel in perfect order, and alight for a few moments on the branches of a dead tree. In their wake comes winged death in the form of a Black-checked Falcon, *Falco melanogenys*, swiftest and fiercest of the raptors. Starlings, in flight, will turn and pursue their enemy until his superior speed outdistances them; but when they have perched, the hawk makes his dash to pick off a rising bird before they can get into formation. Several times the falcon attacks, but the starlings rise too quickly, and wheel to meet him. Finally, with a magnificent swoop, he gets among them as they leave the dead tree, and secures a victim. The impact of the strike can be plainly heard, and, with his screaming prey gripped in his sharp talons, the hawk glides to the ground. The starlings pay no heed to the tragedy going on beneath them, but circle as before. Now they dash with buzzing wings into the reeds, which rustle and bend under their weight, stay a while, with much quarrelsome chattering and flapping, and are up on the wing once more. This performance is repeated many times until, finally, all find perches; and, although the screaming is kept up a while longer, they do not rise again.

Grammatophora barbata (Kamp).—The bearded or Jew Lizard is found mostly in the Mallee and on the plains north of the Divide. It is known in all the States, but is rare about Melbourne. It may attain a length of 18 inches, is very quick in its movements, and hisses like a snake when alarmed.



BEARDED DRAGON OR "JEW" LIZARD

Grammatophora barbata (Kaup)

(Photo by Chas. Barrett)

THE ROYAL BOTANIC GARDENS.

BY A. E. KEW

(Extract from a paper read before the Field Naturalists' Club of Victoria, September 14, 1925)

That world-renowned scientific centre at Kew, known as the Royal Botanic Gardens, is a kind of Mecca, towards which the steps of every visitor to London, whether a student of botany, or like the writer, one claiming no scientific knowledge, but loving trees and flowers, naturally turns.

For nearly a century before Kew Gardens were thrown open to the public, they were a Royal domain. In fact, their foundation dates from the times of the early Georges. Queen Caroline, wife of George II, spent money lavishly on their enrichment, while the Dowager Princess Augusta of Saxe-Gotha, the mother of King George III, may be considered as their practical founder, in a botanical sense. King George III and Queen Charlotte lived much at Kew, and, in a wing of the Royal Palace, which lies to your right as you pass through the main gates, the old, blind, mad King was confined, in the days of Regency. In fact, like most other great British institutions, Kew is steeped in history, and eloquent of a storied past, and to the writer, this constitutes one of its principal charms. It is this association with great names that gives that impression of dignity and spaciousness that the visitor to Kew Gardens, seeing them for the first time, will assuredly carry away. Beneath the exigencies of ruinous taxation and heavy probate duties, the beautiful pleasure grounds that surrounded the "stately homes of England" are fast disappearing. They cost too much for maintenance. Happily for the nation, however, Kew Gardens, with their wide vistas, avenues of magnificent trees, terraced flowerbeds, and broad walks, remain a lasting memorial of the past. To quote Sir W. Thiselton Dyer, who, from 1885 to 1905, was their director, "Kew Gardens possess the grand manner which can be inherited, but not acquired. Wealth can be lavished on a garden, but cannot give it that dignity which is only derived from centuries of growth."

My first visit to the gardens was on April 29, 1924, five days after my landing. The spring of 1924 was wet and

backward in England, and for this reason the Azaleas and Rhododendrons, usually such a notable feature in this month, were not in their fullest bloom. I was to see them later in all their glory, in the gardens of the Villa Carlotta, on the shores of Lake Como; such a veritable feast of colour as memory loves to dwell upon.

I remember the broad walk, which is thirty feet in width and leads up to the Palm House, which, with its water-tower behind it, may be considered as the central point of the gardens. In front of this Palm House, which is of notable dimensions, is a broad terrace with stone flags, set with flower-beds, stone steps and balustrades, descending to an artificial lake. From the Palm House three great, grassy avenues, or vistas, radiate, of which two, the Pagoda vista, to the south, and the Sion House vista, to the south-west, are each more than 1000 yards in length, and of a noble breadth, flanked by avenues of magnificent elms, oaks, chestnuts, limes and beeches. The spacious green sward, as I saw it, was studded with dancing daffodils, a veritable field of the cloth of gold. Of course the consummate art of the landscape gardener is there, but it is the art that conceals art, and gives the appearance of the flowers growing wild. Elsewhere in the Dutch, the herbaceous, and more recently constructed rock-gardens, you may see flowers planted with formal precision: but, in fact, every form and period of the gardener's art, in its highest attainment of skill, can be studied within the boundaries of Kew Gardens.

Of course, as an Australian of some 40 years residence, I naturally made my way to the Temperate House, to see once more the familiar Eucalypts, Acacias and Tree-ferns. These are to be found chiefly in the middle block of the Temperate House, known as the Winter Garden. This block is rectangular in shape and covers an area 216 feet in length by 140 feet in width, the apex of its roof being 60 feet from the ground. It was completed in 1862, at an approximate cost of £29,000. In this Winter Garden the trees that attract most attention are two specimens of the Bunya Pine, *Aruncaria Bidwillii*. These trees have constantly to be reduced in height, lest they should grow through the roof. Specimens of the Norfolk Island Pine *A. excelsa*, Hoop Pine, *A. Cunninghamii*, and New Caledonian Pine, *A. Cookii*, can also be seen.

The Eucalypts, owing to limited space, can be represented only by young specimens. The winters at Kew are too

severe to allow of gum trees being grown in the open air; although further south, notably in sheltered positions in the gardens of Cornwall, and along the south coast, some varieties of *Acacias* and *Eucalypts* do quite well. The flowering season of the *Acacias* lasts, in England, from February to April, so, when I was at Kew, it was almost over, only a few trees in the Winter Garden still had blooms upon them. Wattle, or as it is termed in England, "*Munosa*," is sold a good deal in the flower shops and streets of London. According to Mr. W. J. Bean, flowering branches of the Silver Wattle, *Acacia dealbata*, to the value of 400,000 francs a year are exported to England from France.

Tree-ferns, both *Dicksonia antarctica* and *Alsophila*, are to be seen growing in profusion in the Winter Garden, chiefly lining the main central path, but others are scattered in various parts of the house. It must be remembered that the plants at Kew are not grouped according to country of origin; therefore, the representative specimens of Australian flora will be found growing amidst the vegetation of China and Japan, North and South Africa, the Southern United States and Mexico, the warmer parts of Chile, the middle elevations of the Himalaya and the Andes, and most of the high mountains in the tropical regions. They are, therefore, somewhat hard to distinguish, and have not the familiar aspect of the Bush.

It was with quite a feeling of friendliness, as of an exile from home, that I came across a pot specimen of *Bauera rubioides*, and also a magnificent hanging basket of Sturt's Desert Pea, *Chionthus Dampieri*, the latter in full flower. While on this subject, I might mention that the Gippsland wildflower, *Humea elegans*, known in England as the "incense plant," is fashionable in England as a background for herbaceous borders. I did not see it at Kew, as it was too early in the season, but at Hampton Court, where also there are most extensive gardens, I noted many clumps of it, with its long, feathery plumes, and characteristic odour.

In the Temperate House will also be found the fine collection of *Proteaceae*, such as *Grevilleas*, *Banksias*, *Hakeas*, and others, doubtless descended from the seeds which Peter Good and Allan Cunningham sent home from Australia, in the first decades of the nineteenth century. In the great Palm House will be found all the prevailing types of tropical vegetation, such as palms, bananas, cycads, screw pines and

giant bamboos. Designed by Decimus Burton, and completed in 1848, it is built upon most graceful lines, and is a noble building. Its total length is 362 feet; the transept is 100 feet in width and 66 feet in height, and each wing is 50 feet in width by 30 feet in height.

Originally some nine acres in extent, Kew Gardens have now an area of nearly 300 acres. Like our own Botanic Gardens, they are situated on the bank of a river, but they lack the undulations which give such a great natural advantage to the Melbourne Gardens. Kew is a flat plain, and such variations of contour as it possesses have been produced artificially. Nowhere has the art of the landscape gardener had to contend with greater difficulties. The soil is hungry: sands and gravels predominating, and beds of almost impervious clay. The transforming of such an unpromising area into a realm of beauty is a triumph of human skill and perseverance.

Kew possesses 16 miles of pathways, three separate museums, a herbarium with two million specimens, and a library of some 24,000 volumes. There is also the Jodrell Laboratory for research work in plant physiology; there are at least 10 glass-houses, all open to the public, and the "North" gallery of paintings of flowers and nature scenes, containing more than 800 pictures. Add to these attractions the Rose Garden, the Herbaceous Garden, the Rock Garden, not to speak of the Alpine House, the 70 acres of natural woodlands, the artificial lake, some 4½ acres in extent, the Pagoda, the Temples, the Ruined Arch, and other relics of an interesting past, and I think you will admit that there is a little too much to be seen in two brief visits, or to be described in the limited space which our Editor can afford me.

No visitor to Kew is likely to forget the giant flagstaff, formed of a single piece of Douglas Fir, better known in Australia as Oregon, *Pseudotsuga Douglasii*. This tremendous baulk of timber is 214 ft. in height, 2 ft. 9 in. in diameter at the base, and 12 in. at the top. This is flagstaff number two. The first was put in place by the officials at Kew, and a high wind incontinently blew it down, happily without much damage. Profiting by experience, the Director secured, to erect the second flagstaff, a detachment of sailors from Portsmouth, and the "handy men," being well accustomed to masts and rigging, this time made a secure job of it.

Growing on the lawns and around the lake will be found many beautiful trees such as the Holm Oak, *Quercus ilex*; the Service Berry, *Amelanchier canadensis*; the common Lime, *Tilia vulgaris*, and the White Lime, *Tilia argentea*; the common Ash, *Fraxinus excelsior*, and the London Plane, *Platanus acerifolia*; Common Beech, *Fagus sylvatica*; Oriental Plane, *Platanus orientalis*. Many fine Horse Chestnuts, *Æsculus Hippocastanum*, and Spanish, or Sweet, Chestnuts, *Castanea sativa*, can also be seen, while one Cedar of Lebanon, *Cedrus Libani*, is no less than 64 feet in height, with a trunk measuring nearly 15 feet in girth.

Not only was Royalty intimately associated with the development of Kew Gardens, but great names in the world of Botanical Science cluster around them also—Sir Joseph Banks, who accompanied Captain Cook when he landed at Botany Bay in 1770, was one of their earliest directors. Then there were the Aitons, father and son, who were associated with the destinies of Kew for more than 80 years. Then came Sir William, and afterwards Sir Joseph, Hooker, both of whom were directors of the Gardens. Australia also has played its part in their enrichment, and, owing to the untiring labour of collectors like the Unninghams and Peter Good, its unique flora is well represented. Mr C. Daley has told us of the immense quantities of material that our own Baron von Mueller continued to send for more than 40 years. For the compilation of *Flora Australiensis*, published in 1878, the Baron despatched in instalments no less than one hundred thousand specimens to George Bentham at the herbarium at Kew.

More than three million visitors pass through the gates of Kew Gardens every year. Here you may see the student of botany, with his note-book, carefully studying the labels of the trees and plants, the painter with his easel, and the far larger class of photographers, with their cameras; but far outnumbering these, one notes, with pleasure, the multitude of ordinary citizens of London, people whose everyday lives are perforce passed amid sordid surroundings and mean streets, but are here, for a while, enabled to experience the joy of open spaces and the charm of woodland glades, the infinite variety of the forms and colours of flowers, and to realise something of that superabundant loveliness of Nature which, as Thomas Huxley has said, disarms pessimism.

A STUDENT OF FUNGI—MRS. FLORA MARTIN'S WORK.

We are led, by direct and indirect evidence, to believe that our Club has done much to encourage and advance the study of Natural Science in Victoria. Many members have been, and still are, prominent workers; others, not so prominent, have done excellent work, too, while there are some non-members, who are doing their share in the varied realms of Nature Study, encouraged by the Club's activities.

Mrs. Flora Martin, who died at Drouin on March 14, 1923, was associated with our Club, and recently I became possessed of special evidences of the enthusiastic work carried out by her from the time when she left Melbourne for Drouin, owing to her husband's retirement there for health and other reasons.

Mrs. Martin, in her young days, was a lover of plants, and a diligent student of botany. In her early association with the Club she devoted much time to the study of Fungi. In 1892, when I was arranging the Museum of Economic Botany in the Melbourne Botanic Gardens, and had prepared a showcase of some remarkable specimens of Fungi, donated by the Royal Botanic Gardens, Kew, Mrs. Martin contributed a collection of named Victorian species for inclusion in the case. Evidences of this lady's continuous and devoted scientific interest, and excellent work in her chosen field, are to be found in a number of volumes, which, but for the kind offices of a relative of mine, who owned the property adjoining Mrs. Martin's farm, might, with numberless botanical specimens, sketches, coloured plates, and drawings of fungi, have been destroyed as valueless, after the disposal of other property.

While spending a week-end at Drouin recently, I looked through a pile of coloured drawings and illustrative notes of fungi made by Mrs. Martin during her studies, and put a large number of them together, in case they might be of service to the Agricultural Department or members of the Club. A presentation copy to Mrs. Martin, of Cooke's *Handbook of Australian Fungi*, has the following inscription

signed by the author over his photograph—"In kindly remembrance of the good offices of Mrs. Flora Martin in advancing this work in the colonies, and in securing its official recognition, my thanks are ever due." This volume was exhibited by me at the September, 1925, meeting of the Club, together with the letter from the New South Wales Government to Mrs. Martin, intimating its decision to contribute £150 towards the cost of the work.

Another interesting volume is a copy of *Synopsis of the Queensland Flora*, by F. M. Bailey, presented with the author's compliments to Miss Flora M. Campbell (Mrs. Martin's maiden name), dated 4/8/83. The same author sent his later publications, down to March 28, 1913, when Mrs. Martin received a copy of the beautifully illustrated work, *Comprehensive Catalogue of Queensland Plants*, with the following inscription—"To my old friend, Mrs. Martin, who has done such good work in connection with Australian Fungi." A volume, much studied, judging by the multitudinous marginal notes, and underlinings throughout, is Balfour's *Classbook of Botany* (Part 2, Physiological Botany) inscribed—"Flora M. Campbell, 1874," while a copy of *Outlines of British Fungology*, by the Revd. J. M. Berkeley, was freely annotated by Mrs. Martin, and marked off with numbers, probably corresponding to specimens in her possession. Many other books, such as *Diseases of Plants, Timber and Some of its Diseases*, both by Marshall Ward; De Bary's *Comparative Morphology and Biology of the Fungus, Mycetozou and Bacteria*, and *British Fungi, Lichens, etc.*, Holmes and Gray, together with a complete set of Bentham's *Flora Australiensis*, testify to the thoroughness of Mrs. Martin's studies. My relative at Drouin states that Mrs. Martin had correspondents on botanical matters all over the world, that she was always experimenting with plants on her farm, and that she never possessed a piece of dead wood without inspecting it for Fungi. Part of her farm was left in its natural state, purposely, as a sanctuary both for birds and plants.—F. Pitcher.

Orchid students are reminded that this is the time to look for the unusual form of *Calochilus* which appeared two seasons ago. The absence of the "beard" was its most marked characteristic. The plant was somewhat stouter than that of *C. Robertsonii*, and it bloomed rather earlier.—B.C.

A VICTORIAN GEOLOGICAL PIONEER.

By F. H. CHAPMAN.

One of the outstanding and praiseworthy objects of this Club in the past has been the recognition and memory of the pioneer in science and natural history generally, especially in regard to Victoria. Although the present subject of notice was not a member of the Club, that body has derived indirect, but none the less substantial, benefit, from the knowledge accruing from his work. And with this in mind the following notes are offered* :—

Reginald Augustus Frederick Murray was a native of Perthshire, Scotland, and came out with his family in 1885 to join his father, Capt. Virginus Murray, who was Warden and Police Magistrate on the goldfields. When, on the death of his father in 1861, the family recrossed the sea, young Murray remained behind. He joined the Victorian Geological Survey, under Selwyn, at the age of 16, and found his first experience in the Wilkinson-Daintree field party engaged in surveying the Bacchus Marsh and Ballan districts. When 18 years of age he is found exploring the almost unknown Otway Range country under Wilkinson, their route being from what is now Lorne (Loutit Bay) to the mouth of the Gellibrand River, and thence to Warrnambool. Wilkinson and Murray also made a secondary trip at this time, penetrating the forest from the mouth of the Aire to Irrewillipe, west of Colac, when the Beech Forest was discovered.

As a junior assistant of the Survey, in 1865, Murray was employed in surveying Steiglitz and Meredith, and along the Leigh River to Buninyong. This work terminated in 1869 with the abrupt ending of the survey. Subsequent years find R. A. F. Murray engaged in surveys for Commissions, etc., at Ballarat and Alexandria, and in 1871 he was appointed by the Government to make a survey of the Bendigo goldfield. His later years in the field were mainly spent in Gippsland, where he did such fine exploratory work in the then thick forest country of North and South Gippsland. Murray was

appointed Government Geologist in 1881, which post he resigned in 1897.

The large and solid amount of work carried out by Murray is seen in the long list of reports and maps compiled by Mr. D. J. Mahony, M.Sc., as an appendix to Mr. Dunn's admirable account of Murray's life and achievements. This list comprises about 154 reports and 38 geological maps and sections.

But Reginald Murray will, perhaps, best be remembered by his practical and conscientiously-written handbook on the Geology and Physical Geography of Victoria. So well-balanced were Murray's views of the different authorities when this was written, that it had been taken as a basis of knowledge of Victorian Geology up to the date of its publication. Its value was appreciated by so eminent a critic as Sir Archibald Geikie, who relied chiefly on Murray's text-book for the written paragraphs on Victoria in his widely-read "Text-book of Geology."

And here the writer would like to say how fundamentally useful Murray's work was to him when becoming acquainted, whilst in London, with the details of Victorian geology. Investigating the occurrences of the Tanjilian fauna in Gippsland, which are characterised by the large, cookie-like shell, *Panenka*, discovered by Murray at Tanjil, the writer was assisted by further notes from Murray. It was pleasant to have met him on one occasion, a few years since, and to have had opportunity of expressing one's appreciation of his long life's work. In a recent letter to the writer, Sir T. W. Edgeworth David expressed himself as having a high regard for Murray's work.

During the last 20 years this geological pioneer of the Selwyn regime had lived in seclusion at Willowgrove, on the Tanjil River. He passed away at Caulfield during the last month at the good age of 79 years.

Fossil species named after Murray, which will help to keep his memory green, are the *Tryplasma murrayi*, Eth.fil., a Silurian coral from Waratah Bay, and the *Salsburgha murrayi*, of McCoy, a Ginkgo leaf from the Tertiary at the head of the Dargo River. This latter, however, is still an M.S. name.

*The writer is largely indebted to the Biographical Sketch of Murray, written by E. J. Dunn, F.G.S., to which is appended a full list of Murray's publications, by D. J. Mahony, M.Sc.—Bull. Geol. Surv. Vict., No. 23, 1910.



WIRE-FENCES DEATH-TRAPS FOR BIRDS.

Since the establishment of settlement in Victoria, the native fauna has been contending with many enemies. Apart from the destruction caused by foxes and "wild" domestic cats, the barb and plain-wire fences have taken toll of our birds and animals. These fences often are concealed in dense scrub, or long grass, and are constantly proving death-traps to many wild birds. Recently, in the scrub at Mooroolbark, I came upon a fence which had just added another victim to the list. Suspended by the right wing from the top barb-wire was a Laughing Kookaburra, *Dacelo gigas*, who had been caught and firmly held by one of the pointed barbs. The feathers at the wound had become so twisted and knotted that the unfortunate bird was unable to free itself. Here it had lingered for at least two days before dying. When discovered, about three days later, it presented a starved and miserable appearance. With the exception of the wound at the wing, and a little skin off its legs, no blemishes were visible. Although the pointed barb had penetrated just under the skin at the elbow of the wing, yet the bird was held so firmly that I had difficulty in removing it from the wire.—D.D.

NATIVE CATS NEAR MELBOURNE.

The Great Spotted-tailed Native Cat, *Dasyurus maculatus*, or "Tiger Cat," as it is commonly called, is now rare in Victoria, but the Common Native Cat, *D. viverrinus*, has adapted itself to changed conditions, and occurs still even close to Melbourne. The National Museum received specimens from Studley Park, fairly recently, and on October 26 last a young one was captured in a coachhouse at Ivanhoe. It was discovered early in the morning in a chaff-bin, and later entered a wire-trap. Its captors presented it to the Zoological Gardens, where I stalked it with a Graflex camera.

Mr. A. Wilkie, the director, had the little marsupial placed in a large enclosure, and, with much trouble, a portrait was obtained. The "Cat" was so nimble-footed and clever at dodging the lens that only one of six snapshots was successful. We admired the animal's boldness. It displayed anger, not fear—a fierce nature. These small *Dasyures* are known to be poultry-killers, and in some districts many have paid the penalty for raiding.—C.B.

THE BLACK-FACED WOOD SWALLOW.

Has the Black-faced Wood-swallow, *Artamus melanops*, been recorded for Victoria? During the last two years I have seen odd pairs throughout the year, in Red Cliffs district. It is apparently a resident species, or perhaps more correctly, nomadic. Its favourite haunt is along the roads, and it nests in tree-spouts and on the tops of stumps. In the circumstances its chances of rearing young are slight, for school-children have no difficulty in finding such exposed nests. In nests that I have examined, two eggs have formed the clutch.—L.G.C.

BIRD STRATEGY.

The White-eared Honeyeater, *Meliphaga leucotis*, is a master strategist. It is true that his clear call, "We-rook," sounding all day long, may guide you toward his home; but he calls from the tree tops, while the nest is in the bushes below, and how silent he is when he approaches it! Should some thoughtless human step too near, the bird will drop like a stone, and flutter along the ground with dragging wing. If the watcher refuse to be lured away, the bird cries plaintively; no Tang, *Epthianura albifrons*, could do better, and Tangs are masters of this art. Should you, the dreaded intruder, retreat a few steps and hide, anxiety conquers wisdom, and the honey-eater darts to the nest to make sure that the brood is safe. You move, he is gone; you approach the nest and he is fluttering again on the ground, while, within a cup of bark and hair, two nestlings that, a moment ago, called, with outstretched heads, for food, crouch flat and still, two patches of striped-grey down, almost invisible from a step away. You touch them, and the parents, seeing there is no longer hope of misleading you, dart downward, in fear for their offspring. Again and again they strive to drive the intruder away, but if this avail nothing, they

will not allow their own fear to harm the nestlings, but, even while a strange hand touches the nest, they doubtfully hop toward it, from branch to branch, with food that they place at last within the wide mouths, whose owners have forgotten caution in their hunger.

While the young are still in the nest, the parents can do no more than this, yet this is only the beginning of their care. When they first leave the nest, if you approach too near the first trick is repeated; and, be it noted, so far as I have seen, once the nest is found the birds do not try and lead you away, but as soon as there is something new to hide they try again to mislead. If this fail they have another defence. I have seen a pair, with a young bird, fly most noisily and ostentatiously across a paddock, flying low and turning sharply to return to the bush they left; but only the parents reached it. Walking to the point at which they had turned, I discovered a large tussock, and behind it, flat and silent, the young bird. I bent down, but with a flash of tiny wings the fledgling had returned to its parents. I followed again: would have touched that young bird, but, between my hand and its body, darted two furious birds, with mandibles, too angry, it seemed, to fear; and, in admiration, I left them alone.—J.G.



TWO ORCHIDS OF WESTERN AUSTRALIA.

The illustrations show two orchids of Western Australia which were exhibited at our Flower Show on September 22. Neither, so far, has been recorded in this State; though, being very small and not brightly coloured, they may easily have been overlooked by the collector.

Oaleana nigrita (Lindley).

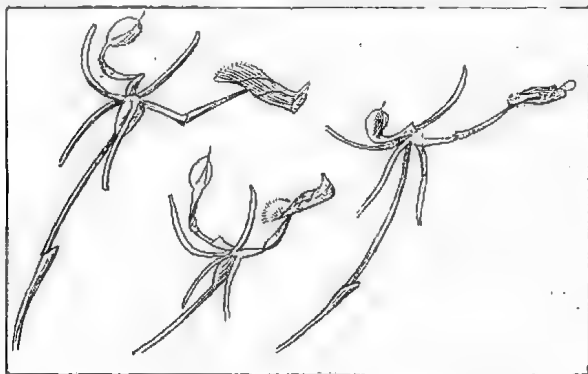
In this species the labellum hangs poised above the column on the same peculiar strap-like hinge, which we note in our

Victorian species of *Coleana*. The flower is inverted, the labellum being above, instead of below, the column. My specimen, although gathered some days before September 22, shows no sign of fading. It is probable that, as in the



CALEANA NIGRITA (H. P. Dickins, Del.).

case of *Coleana major*, which often remains in flower for six to ten weeks, this is due to non-fertilization. At first glance the flower seems to be cleverly adapted for cross-pollination, and no doubt it is occasionally fertilized by visiting insects,



DRAKEA ELASTICA (H. P. Dickins, Del.).

but closer examination would show that this may not be so easily effected as appearances indicate.

The resemblance to the flying duck in *Calceana nigrita* is not so pronounced as in the Victorian species of this genus, in which the broad, hollow, cup-like formation of the back part of the labellum, and the narrow, beak-like, shape of the front part, make a faithful copy of the head of the bird.

Drakaea elastica (Lindley).

Though this orchid is not on the Victorian list, we have two closely-allied species, which were formerly classed as *Drakæas*; but Lindley's genus, *Spiculæa*, being reinstated, these have become *Spiculæa Huntiana* and *Spiculæa irritabilis*.

In *Drakaea elastica* the hammer-shaped labellum is very sensitive, and the long column is characteristic of the genus. The lamina of the labellum is divided into two unequal lobes by a constriction near the insertion of the claw. Longer lobe markedly glandular; hairy in the basal half, elsewhere smooth, upturned at its free extremity; shorter lobe hairy and very glandular. Anther blunt, but rostellum much prolonged so as to simulate another point.

From first-hand knowledge I can say little of *Drakaea elastica*, as this is my introduction to it. The above is Dr. R. S. Rogers' description, which would, I think, be better than that of either Fitzgerald or Bentham.—S.C.

Part III of Mr. J. M. Black's *Flora of South Australia* is ready for the printer, but must wait its turn with other publications of the British Science Guild. Mr. Black and Dr. J. S. Rogers have ungrudgingly given a great amount of time, with their only reward, appreciation by fellow-workers in the field. South Australia is fortunate in having scientific men, who have both leisure and ability for such work. In Victoria we have provided an up-to-date census of plants, but figures and descriptions are lacking.—A.J.T.

The Kew *Bulletin*, No. 8, 1925, refers to the effort being made by the Committee on Australian Botanical Nomenclature to conserve the generic names, *Muehlenbeckia*, *Dendhamia*, *Oreomyrrhis*, *Leucopogon*, *Olearia* and *Angianthus*, which are all ante-dated, the first threefoldly. The reasons for retaining them are published in the *Journal of Botany*, July 1925, pp. 210-213; by Mr. J. M. Black, secretary of the Committee, and it is to be hoped that the next International Botanical Congress will see fit to add them to the list of *Nomina generica conservanda*.

The Victorian Naturalist

VOL. XLII—No. 8

DECEMBER 11, 1925

No. 504

FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, on Monday evening, November 9, 1925. The President, Mr. Geo. Coghill, occupied the chair, and about fifty members and friends were present.

CORRESPONDENCE.

A letter was received from the Hon. Secretary of the Bass Park Trustees in reference to the interesting lime deposit in the Park. He stated that the Trustees were protecting the deposit for scenic reasons, and had resisted several attempts to have the lime removed.

REPORTS.

Reports of excursions were given:—Ringwood, Mrs. E. Coleman; Spring Vale, Mr. H. B. Williamson; Greendale, Mr. F. G. A. Barnard; Belgrave, Mr. F. G. A. Barnard. A vote of thanks to Dr. and Mrs. Shuter and Mr. and Mrs. Coghill for their hospitality to excursionists on the Greendale and Belgrave excursions, respectively, was carried unanimously.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Milbourne, 257 Beaconsfield Parade, Middle Park, Mr. E. S. Hanks, 736 Sydney Road, Coburg; and Mr. L. R. Williams, Glyndon Avenue, Brighton, were elected as ordinary members; and Mr. and Mrs. S. S. Strutt, "Hanslett," Tongala, as country members of the Club.

GENERAL.

Mr. F. Pitcher reported that he had obtained from the Trustees of the National Park particulars of the proposed parking-area at Sherbrooke. They stated that the spot was outside the area under their control, and that no damage would be done to the Park or adjacent beauty spots.

LECTURE.

"Central Australia," by Mr. Lance Le Souef. The lecturer described various parts of the interior, in Western and Central Australia, sketched phases of life on the stations, and gave an account of the "desert" country's progress and prospects. Vast areas, popularly supposed to be worthless, or nearly so, were in reality well suited for sheep or cattle. There was a great future before Central Australia when modern transportation facilities were provided, and adequate means for obtaining the water that existed underground. The lecturer dealt with plant and animal life in the interior, mainly from the economic standpoint. Several members expressed keen appreciation of the interesting and enlightening lecture, which was illustrated by a number of excellent lantern slides. On the motion of Messrs. Pitcher and Barnard, a hearty vote of thanks was accorded Mr. Le Souef.

EXHIBITS.

By Mr. F. G. A. Barnard: King Fern, *Todea (Osmunda) harburii*.

By Mr. F. Chapman, A.L.S.: Tertiary leaves from Ten-mile Creek, Narracan.

By Mr. Geo. Coghill: The following flowers grown at Canterbury.—*Crevillea rosmarinifolia*, *Viola hederacea*, *Swansea*, sp., *Prostanthera nivea*, *Kanzea parviflora*, and the New Zealand Manuka, *Leptospermum*, sp.

By Miss Currie, of Lardner: Cocoons and perfect insects of a small Chalcid fly.

By Mr. J. E. Dixon: Remarkable variation of *Macrohelodes crassus*, Blackb., a beetle of the family Dascillidae; about 30 varieties from Frankston.

By Mr. Latham: Blooms of *Callistemon lanceolatus*.

By Mr. A. E. Rodda: Tall growths on branch of Acacia, from You Yangs.

By Mr. H. B. Williamson, F.L.S.: Specimens of *Pimelea Freyana* (F.v.M.), Ewart and Rees, Tallangatta, October, 1925. Flowering specimens of *Pultanea graveolens*, Tate, Steiglitz, Mr. E. Cooper, snr., previously gathered only by Mr. S. Johnson, of Meredith, in 1893, and placed with specimens of *Pultanea villosa*, Willd. Specimens of:—*Casuarina Lohmannii*, R. T. Baker; *Myoporum deserti*, A. Cunn.; *Calotis anthemoides*, F.v.M.; *Brachycome basaltica* (var. *gracilis*), F.v.M.; *Rumex crystallinus*, Lange, from the plains of the Lower Ovens; *Halorrhagis elata*, A. Cunn.; Warby

Ranges. All collected by the exhibitor, and new for N.E. *Burnettia cuneata*, Lindl., and *Thelymitra grandiflora*, Fitz., collected by Fred. Barton, jr., at Foster; new for East. *Prostanthera decussata*, F.v.M., Brisbane Ranges, collected by Mr. Boardman; new for S. A scrap of this plant was obtained in 1923 by the Rev. A. C. F. Gates.

THE PROPAGATION OF OUR PTEROSTYLES.

By W. H. NICHOLLS.

(Communicated by A. J. Tadgell)

The pollinary mechanism in our orchids, especially the well-known *Pterostylis*, popularly called Greenhoods, is of a highly specialised nature, and is described by Dr. R. S. Rogers in his "An Introduction to the Study of South Australian Orchids," 1911. As there is no authentic record of the finding of seedling plants, especially in the very early stages of their existence, the discovery this spring of a number of undoubted seedlings is of interest to all who love to study these curious and fascinating flowers.

It is a well-known fact, or a matter of general belief, that most, and perhaps all, terrestrial orchids propagate their kind chiefly by the vegetative development of tubers on the main root or at the terminals of the wandering roots. In a state of nature these *Pterostyles* are found sometimes solitary, sometimes in small scattered groups, at other times in colonies so dense that the ground for yards is carpeted with their rosettes, as is the case with '*Pterostylis concinna*, R.Br., *P. nutans*, R.Br., and *P. pedoglossa*, Fitz. These three species are cited as being common plants in the neighbourhood of Melbourne. *P. concinna* is quite the commonest orchid under the tea-tree along the coast. *P. nutans* is found there, and practically everywhere else, while *P. pedoglossa* hides its frail charms among the stems of shrubs that flourish on our sandy heathlands.

In September last the writer received from New South Wales an excellent example of the above vegetative process in *P. curta*, R.Br. This specimen was collected by the Rev. H. M. R. Rupp, on Hungry Mountain, in the Pater-

soil district. The plant produced four tubers. It appears to be plentiful in that district, growing intermixed with *P. nutans*. On the other hand, it must not be conceived that the wonderful mechanism perfected by nature to ensure production of fertile seed, is peculiar to the Greenhoods, or without result. This, indeed, is far from being the case, for sufficient proof is available to show that seed production is of paramount importance for the spread (if not the existence) of this and many other genera.

An examination of the plants of the various species in different seasons proves that many of them, with their limited root systems, are quite incapable of producing more than a single tuber each year, such tuber being for the sustenance of the plant when next it vegetates. It will be found that the majority of these produce seed capsules freely or frequently. The best known instances are *Pterostylis longifolia*, R.Br., *P. alpina*, Rogers, *P. rufa*, R.Br., *P. obtusa*, R.Br., *P. barbata*, Lindl., *P. nutica*, R.Br., and *P. decurva*, Rogers. These species are rarely found other than as solitary specimens, or in small groups, though one may occasionally find, as for example, when in 1923 and 1924, we crossed the Baw Baw Plateau, *Pterostylis alpina* occurring very plentifully, the plants being huddled together in large groups as if for protection from the icy cold of these regions.

A visit now to any of the coastal districts where we find *Pterostylis concinna*, R.Br.; *P. nana*, R.Br., or *P. alata*, Reich., growing, will show that even with these types which chiefly propagate their kind by the underground production of tubers there is abundant seed produced. That plants are produced from this seed is evident by the hundreds of very small plants which are observed in some seasons. *Pterostylis Toveyana*, Ewart and Sharman, a very rare coastal form, is an undoubted hybrid, the parent plants being *Pterostylis concinna* and *P. alata*.

Occasionally, when the season is suitable to their growth, many of our rare *Pterostylis* appear in considerable numbers in some districts. An instance of this occurred during the spring of 1923, when near the Bayswater Railway Station we found *Pterostylis acuminata*, R.Br., growing in large numbers. Prior to this discovery it was very rare; this year we found none at all.

Specimens collected at Bayswater, N.W. Victoria, Cravensville and Mordialloc, are identical in all respects, but those from New South Wales and Queensland differ in having a more acuminate labellum. The months of blooming in

New South Wales are March to June; in Queensland, July and August; and in Victoria, August to December.

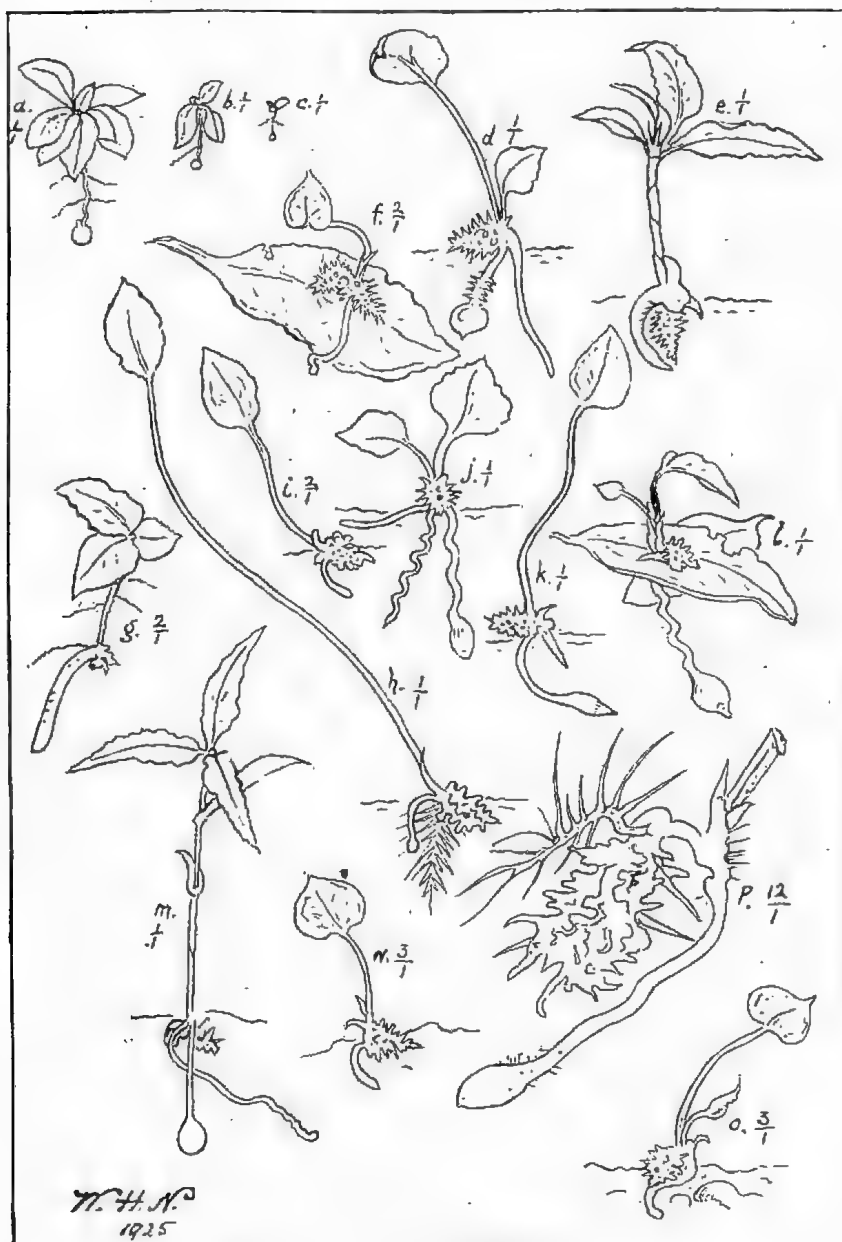
Dr. Rogers, who is familiar with the types from the other States, writes: "It is not a hybrid, but *P. acuminata*." He also mentions the slight difference in the labellum, and in the flowering times. It will thus be seen that this orchid is found in flower in one place or another in all months, except January and February.

On a recent excursion to Gippsland, the writer had the good fortune to locate a colony of *Pterostylis longifolia*. While his party rested by the roadside, the writer examined a likely-looking spot for orchids under a grand old Eucalyptus tree. A thick carpet of wet leafmould lay upon the ground. Growing in this were many plants of this species in all stages of development, from minute seedlings to flowering plants. Many of the smaller seedlings rested on solitary leaves, their rootlets searching through cracks and over the edges of the leaves, for the cool moisture beneath. None of these plants were rooted in the soil proper, and specimens of all were readily removed without damage. These, together with specimens found at Mount Evelyn and other places, form the subject of our illustrations.

On the basalt plains not far from Sunshine there is a largish colony of *Pterostylis reflexa*, R.Br. A recent visit revealed further interesting evidence, proving beyond all doubt that those species which are found in colonies do produce abundant and fertile seed. Within ten feet of a carpet of large rosettes, and a little below, there is a deep and widely-cut drain. Lining the bottom and sides were numerous small rosettes. They could not be other than plants of the above species, which had originated from seed, as, upon enquiry, I found the drain to be of comparatively recent construction. All of these plants and those in the immediate vicinity were quite small, many rosettes measuring but a quarter of an inch across.

In this locality the grass grows very tall, and burning-off is practised nearly every summer. Possibly the heat and the after-effects are beneficial to the germination of these minute bodies, which probably had been blown or washed into the drain, and there found an ideal home in the loose, unoccupied surface of the soil.

In the B.A.A.S. Handbook of South Australia (1914), Dr. Rogers writes: " . . . that during seasons following extensive bush fires, the hills become veritably carpeted with

Seedling Plants of Some Species of *Pterostylis*.

(Drawings by W. H. Nicholls)

orchids, many of the species being comparatively rare at other times. The plants are far too numerous to be accounted for by stimulation of the buried tubers, and the probable explanation appears to be that the fires have created conditions favourable for the germination of seeds dormant from former seasons."

Other discoveries could be cited relative to the growth and spread of our *Pterostyles* in this manner, but enough has been written to show that these special contrivances (so clearly described by Dr. Rogers), and characteristic of all orchids, serve a very useful purpose, and that, without fertile seed, many species would soon be lost for all time.

KEY TO ILLUSTRATIONS

a.b.c.—Seedling plants of *Pt. reflexa*, Sunshine, June, 1925; d.e.f.—Seedling plants of *Pt. longifolia*, Drouin, October, 1925; g.—Seedling plant of *Pt. vittata*, Black Rock, May, 1924; h—Tall seedling plant of *Pt. longifolia*, Drouin, October, 1925 (note the "feathery" rootlet); i.j.k.l.m.—Seedling plants of *Pt. longifolia*, Drouin, October, 1925; n.o.—Seedling plants of *Pt. parviflora*, Mt. Evelyn, September, 1925; p.—Enlarged root system of seedling plant of *Pt. longifolia*.

PLANTS FROM MALLACOOTA DISTRICT.

On a recent visit to the Mallacoota district, East Gippsland, Mr. V. Miller found the beautiful crimson-flowered *Grevillea Victorice*; but it is not recorded from East Gippsland in our Census, which will now read, "N.-E., E." On Mount Bogong the leaves of some plants of this species are very long, while on others they are shorter and more ovate in shape. Mallacoota specimens are referable to the form known as *G. Victorice* var. *brevifolia*. This Royal *Grevillea* evoked an outburst of enthusiasm when first found by Baron von Mueller (who regarded the Alps as its proper home), when he wrote to Sir William Hooker; "What an introduction to Kew this plant would be—a plant that requires no protection in England." Mr. C. Barrett brought back from Mallacoota, among many other interesting plants, the Short Bristle Fern, *Trichomanes humile*, only recorded previously from Mount Bogong and the Dandenongs. Thus the Census should be altered to read, "S., N.-E., E."—A. J. TARDRELL.

THE LATE MR. JOSEPH HENRY - MAIDEN, I.S.O., F.R.S., F.L.S.

The report of the death of Mr. J. H. Maiden, at Turramurra, N.S.W., on November 15, at the age of 67 years, was received with very great regret, both by those who had the privilege of knowing him personally, and those who know him only as Australia's leading botanist, and had been following with so much interest the progress of his great work on the genus *Eucalyptus*.

Many of us were unaware that, for a long time, Mr. Maiden had been so seriously crippled in health that he had been greatly hampered in his task. His heroic struggle, in face of his painful disabilities, to bring it to completion, aroused deep admiration in all his friends; and, although his end, as the result of heart failure, did not come as a complete surprise, yet it caused a feeling of regret and disappointment that he was not permitted, by the publication of the final number of the "Revision," to crown what he has described as his life work.

The decision of the Minister for Forests to terminate the publication of "The Forest Flora of New South Wales," which was begun in 1904, and had reached its 77th part last year, must have been a matter of regret to Mr. Maiden; but in the distressing circumstances in which he was working, perhaps he was not altogether sorry to have been relieved of its responsibilities, so that he could devote all his remaining energies to his main objective.

Until his death, in 1896, Baron von Mueller had been the undisputed authority in all concerning the Australian flora. Indeed, he had for so long occupied this position that he had come to look upon the field as his own domain, and, perhaps with some justification, was even inclined to regard the description by another of any new species, more particularly in his pet genus *Eucalyptus*, without his imprimatur, as an intrusion within his province, and even as something perilously verging on an impertinence. Just before the Baron's death, however, Mr. Maiden, in conjunction with the late Mr. Henry Deane, had commenced to participate in the elucidation of our great and perplexing genus, and the description of their first species, *E. propinqua*, appeared in

the *Proceedings of the Linnean Society of New South Wales*, in 1895. Up till 1901 nine papers by these gentlemen, entitled "Observations on the Eucalypts of New South Wales," had appeared in the same publication, and, as the result of their collaboration, 14 species were created.

Mr. Maiden thereafter published most of his species independently, and has created altogether some 88. He was, however, joined with others, notably with Mr. R. H. Cambage, and with Mr. Blakeley, in the differentiation of 23 additional, and, according to report in a paper quite recently given to the Royal Society of New South Wales, a further 16 species are to be credited to him and the latter.

In 1893 the first part of "The Critical Revision of the Genus *Eucalyptus*" came from the press. With the exception of 1906 and 1909, each year has been marked by the appearance of one or more parts, even as many as seven being published in 1921, and six the following year. This year the 64th became available to us. In these Mr. Maiden has dealt with the genus in the most exhaustive manner, and the latest species admitted by him brought the total of those considered valid to 361. Apparently only the rest of the seeds, the descriptions of the seedlings, which are to be figured in colour, and the key remained to be published. Seeing that this last was in his own words "really the main object in writing the work," it is a relief to learn that he had completed it before his death, and that it is now in the press, and will ultimately be published. Even from the time of his arrival in Sydney, 44 years ago, Mr. Maiden's life was always actively devoted to the cause of science. He was at first assistant to the late Professor Beattie, but was soon appointed the first Curator of the Technical Museum in Sydney, in 1881, holding this office until 1896. In the interval he also acted for a time as Superintendent of Technical Education and Consulting Botanist to the Departments of Agriculture and Forestry. In 1896 he became Government Botanist, Director of the Botanical Gardens, and officer-in-charge of the Centennial Park, and held these appointments until his retirement last year, having in this period originated and built up the very fine National Herbarium, now existing in the sister State.

In addition to his official duties, Mr. Maiden undertook many of an honorary character, and was, citing only the more important—Permanent Honorary Secretary, and local Honorary Secretary for New South Wales, to the Australian Association for the Advancement of Science for 14 years, resigning on account of ill-health in 1921, and being then

elected an Honorary Life Member for his valuable services. He was for some time Honorary Secretary to the Royal Society of New South Wales, President of the Horticultural Society of that State, President of the New South Wales Branch of the Australian Forest League, and helped in the origination of the Wattle Day celebrations.

Besides the two large works already referred to, Mr. Maiden was the author of the well-known "Useful Plants of Australia," "Illustrations of New South Wales Plants," a "Life of Sir Joseph Banks," and, with the late Mr. Ernest Betcher, "A Census of New South Wales Plants." He was, moreover, responsible for 45 papers in the *Transactions of the Royal Society of New South Wales*, 95 in the *Transactions of the Linnean Society of New South Wales*, and for many others in the "Agricultural Gazette of New South Wales," and in this and similar journals.

That Mr. Maiden's work has been recognised, and that it has not gone without honour, is evident when we remember that he received the Linnean Society's medal in 1915, being the first to be so distinguished in this country; that he was elected a fellow of the Royal Society and also received the Imperial Service Order in 1916, the Mueller Medal from the Australian Association for the Advancement of Science in 1922, and the Clarke Memorial Medal from the Royal Society of New South Wales in 1924.

Mr. Maiden's kindly disposition endeared him to all those with whom he came in contact, his devotion to duty in spite of long continued ill-health earned him universal respect and the loss his death has occasioned will not be easily overcome.

BALD COOT FEEDING.

At Lake Wendouree, Ballarat, last December I was interested in watching the aquatic birds through binoculars. A Bald Coot, *Porphyrio melanotus*, perched on a tangle of weeds, was tugging at the flower-stem of a large plantain-like weed that grows thickly in the lake. The stalk came away suddenly, and the big blue bird fell backward into the water. Recovering his perch, he held up the stem with one foot and peeled it with his bill, as one would peel a banana, afterwards feeding on the succulent centre. I have noticed Coots, *Fulica atra*, diving for, and eating, weeds in other waters. Doubtless the birds of this family are useful in helping to keep down these troublesome growths—
A. E. RODDA.

AN ISLE OF ROMANCE AND REALITY.

In a naturalist's life romance is mingled often with reality, though some men are slow to admit that they have gained pleasure, stepping aside from the straight path of science. Facts alone, they say, are worth remembrance, and should be recorded starkly. But many of us are nature lovers rather than scientific naturalists, and in beholding the beauty of wild life we may win—and be the richer for it—glimpses of romance. There is true romance in the story of Dunk Island, as told by the late Mr. E. J. Banfield, in "The Confessions of a Beachcomber" and other books. But not romance alone. For their author was a keen and faithful observer, and missed none of the opportunities offered by Fortune lavishly.

"Last Leaves from Dunk Island," published in November by Messrs. Angus and Robertson Ltd. (Sydney), is a notable addition to Australian books of the open air. The "leaves" will help to keep green the memory of a sane and "great-hearted man," who loved nature more than science, who wrote wisely and with a golden pen, and made his island home renowned in many countries besides Australia. Since Thoreau's time no naturalist-recluse so remarkable as E. J. Banfield has told the world the story of his life with wild nature, and recorded his thoughts, observations, and expounded his rich philosophy.

In his Introduction, written with rare insight and sympathy, Mr. A. H. Chisholm gives a brief biography of the self-styled "Beachcomber," who, with his wife, lived on Dunk Island for 25 years. The tropic idyll ended, as all idylls must, sorrowfully. Death came at last to the tropic isle. Some among us have been on Dunk Island; few have not read the Beachcomber's books. Nothing in Australian literature is more distinctive than "The Confessions of a Beachcomber." Its author has enriched our national literature, and, also, he has added not a little to the knowledge of plant and animal life in North Queensland—his territory an isle of romance. His bird biographies are perfect in their way; of beach plants and trees and flowers of the jungle he wrote as excellently. Birds were favourites, yet our friend, especially in his later years, was most loyal to botany. Like all true naturalists, he declined to be exclusive. The specialist has his place—a high one; but the great men have nearly all been general in their studies (specialising, too, maybe)—as Darwin, Bates, and Wallace.—C. BARRERT

THREE SPECIES OF PIMELEA.

By H. B. WILLIAMSON, F.L.S.

The genus *Pimelea* belongs to the family *Thymelaeaceae*, which includes the *Daphne* of the Northern Hemisphere, *Gnidium* and *Struthiola* of S. Africa, and the prostrate alpine shrub, *Drapetes*, of the Tasmanian highlands and the Australian Alps.

The members of the family are noted for the great tenacity of the inner bark, and the genus *Pimelea*, which is limited to Australasia, has been referred to under the vernacular "Tough-barks." The genus contains 78 species, 22 of which occur in Victoria, one of which, *P. simplex*, however, appears to have been wrongly recorded for the State. Of these 22 species, 14 have been recorded for the Melbourne district, one from the Mallee and the S.W. and S. coast and the remaining seven are each limited to one district. With the aid of Mueller's key, and the information regarding distribution given in the Census, a beginner should not have great difficulty in making out any of the common species. Mueller's key to the genus is well set out, and is as easy to follow as any in the book, the distinctions being based on the leaves—whether scattered or alternate, incurved or recurved, calyx and bracts hairy or glabrous, flowers terminal or axillary, etc.

Certainly *P. humilis*, *P. glauca*, *P. collina*, and *P. spathulata* present some difficulty, but, generally speaking, the first-named can be known by its hairy flower stem, the second by its narrow leaves prominently veined below, and distinct marginal vein. The third can be separated from the fourth by its incurved leaves, *P. linifolia* having flat leaves drying recurved.

Pimelea Treyvaudii, F.v.M., Ewart and Rees, Grey
Rice-flower.

In 1893 the late Mr. H. H. Treyvaud, when in charge of the Oudgawa State School, discovered this plant on the hills, seven miles to the north of the township. Baron von Mueller merely labelled it, and "*Pimelea Treyvaudii*" remained as an MS. name for 20 years.

It was then taken in hand by Professor Ewart, and the description and figure were published in the *Proceedings of the Royal Society of Victoria*, Vol. XXIV, March, 1912.

It would appear that Mr. Treyvaud collected this species only once, and then took only two specimens, one of which he kept, while the other constituted the type which is still in the National Herbarium. I understood from Mr. Treyvaud that he had not been able to find the plant again. With a faint hope of rediscovering it, I set out for Cudgewa from Chiltern last month, but, by mistake, boarded a train on a Monday, a day on which Cudgewa has no train service, so was forced to stay in Tallangatta. Advised by Mr. Perry, the local forest ranger, where I might spend the day most profitably, I followed a bridle-track over a saddle of the range towards Granya, and, near the top, found many specimens of the rare *Pimelea*. Returning by the new road, several miles along the range, I found the plant again in great abundance at about the same altitude. Evidently it is rather widely spread, after all.

As I gathered, on the same range, specimens of *Pultenaea polifolia*, only recently recorded for Victoria (Mitta Mitta, S. Clinton), and some plants of a *Grevillea* and a *Brachycome*, both of which appear to be undescribed species, it would seem that the place has not been systematically searched by an experienced collector.

Mr. Perry has since then sent me more advanced specimens of the *Pimelea*, and their state indicates that the flowering time is prolonged. I should not be surprised to find flowers at the end of November. Like most of the *Pimeleas*, this species bears numerous flowers on a common receptacle, as in the family Compositæ, and they bloom from outer to inner, those near the centre appearing last. Associated with this plant was a congener, *P. spathulata*, of the same size and habit, so that one might easily pass them by as being identical, but examination of the involucre at once reveals the difference. The head of *P. spathulata* is surrounded by four broad bracts, shorter than the flowers, while that of *P. Treyvaudii* has an involucre of eight or nine narrow bracts, as long as the flowers. Only three other Victorian species have more than four bracts—*P. octophylla*, *P. phyllioides* and the variety *hypericina* of *P. ligustrina*.

Pimelea spathulata, Labill. Spoon Rice-flower.

During the same trip to the N.E. it was my good fortune to see a wonderful display of the blooms of this Rice-flower. I would scarcely have believed that a species of *Pimelea* could make such a show, though I know that the Western Australian species, *P. suaveolens*, *P. spectabilis*,

P. rosea and *P. Luehmannii*, can surpass any of those found in Victoria for size and beauty of individual blooms. The chain of low hills extending from Glenrowan for twenty miles north towards the Murray River, and in the northern half running parallel to the Ovens River, is known as the Warby Range. The range has been noted in its association with bushrangers, for at Peechelba, nearby, Morgan was shot; and later, at Glenrowan, near the southern point, a hill named Morgan's Look-out, the Kelly gang met its Waterloo.

Ascending the rocky side of the range near Peechelba, and lamenting the unfavourable aspect brought about by sheep, rabbits and fires, I was agreeably surprised on reaching the summit, to find the large shrubby form of *P. spathulata* thickly clothing the hillside and ridge. There was a wealth of white blossom, such as I had never seen displayed on any other Victorian plant. Acres were covered with bushes, three or four feet high, each being a mass of bloom. Besides these, and a few fierce and gloomy-looking bushes of *Acacia triptera*, there were no other flowers.

Pimelea ligustrina, Labill. Tall Rice-flower.

This species, which, like the last-named shrub, is widespread through the State, has large leaves, and its heads of flowers are surrounded by four broad bracts—except in the case of the variety *hypericina*, mentioned above. It is the finest of our Victorian species, and is one of the features of the journey along the Great Ocean Road, from Beech Forest to Moonlight Head and the Gellibrand River, sharing with Satinwood, *Phellodium squameum*, and Balm Mint-bush, *Prostanthera melissifolia*, pride of place for floral pageantry. It is known locally as "Currajong," a name which can be traced to the aborigines, who applied it to plants with useful tough bark, but the use of which we restrict to a small tree indigenous to the N.E. of the State.

The Purple Iris, *Patersonia longiscapa*, has flourished luxuriantly this season around Frankston, Langwarrin and Mornington. It does not seem to be generally known that the flowering apparatus of this plant works on the "magazine" principle. If a specimen is kept in water when the flower dies off, others will appear in succession, the number varying according to the stage at which the stem was picked.—G. Cox.



(Above) SPOON RICE-FLOWER, *Pimelea spathulata*, Labill.

(Below) BUGLE, *Aiuga australis*, R.R. (1 ft. high)

(Photos by H. B. Williamson)

EXCURSION TO GREENDALE.

The excursionists to Greendale, on October 31 were favoured with delightful weather. The party was met at Bacehus Marsh by Dr. Shuter. A detour was made to a point on the road which passes over the shoulder of Mount Blackwood, whence was "wide wandering for the greediest eye." To the north lay the extensive Wombat Forest, reaching from near Gisborne to the vicinity of Daylesford, and broken only by one visible patch of cultivation at Blackwood. To the west, Mount Buninyong was the most notable elevation. As the eye turned south, the Pyke's Creek Reservoir was seen gleaming in the sun a little more than forty miles away. Due south the low mass of the Brisbane Ranges, the Anakies, and the Yau Yangs were picked out. The haze prevented sight of the sea and the city, but the Dandenongs and Mt. Macedon completed the round of prospect.

At Greendale the fine conifers surrounding Dr. Shuter's house were admired. The house, of local sandstone, was built by Dr. Shuter's father about 70 years ago, and the trees presumably were planted at the same time. A *Pinus Canariensis* about 70 feet in height attracted much attention; on the young fruits of this tree, our host told us, Black Cockatoos are fond of feeding, and appear to become quite intoxicated as the result. Another pine, the cluster, *P. pinaster*, was a good specimen of its kind. This tree is grown in the Landes, in the south of France, and provides much of the turpentine in use. There were also several huge specimens of *Cupressus macrocarpa*, the Monterey Cypress, and another rare species of the same genus, *C. thurifera*, also North American. To complete the list were several particularly well-grown specimens of *Pinus radiata*, the Monterey Pine. This species is almost entirely composing the plantations now being made at our State Schools for endowment purposes, yet for the best of those at Greendale, one with a stem diameter of more than four feet, eight shilling has been offered for milling purposes! Olive-backed Orioles, *Oriolus sagittatus*, were noisily active in the topmost branches of the pines.

The forest approaches to within a short distance of the house, and was entered after lunch. It was composed mainly of the Messmate Stringybark, *E. obliqua*, the Common

Peppermint, *E. australiana*, the Swamp Gum, *E. ovata* and the Blue Peppermint, *E. dives*. The last-named was, in some places, very abundant. It was flowering, as is its wont, at its very early growth, and some unusually large trees were noted. A few specimens of the Apple Box, *E. Stuartiana*, and the Yertchuk, *E. Consideriana*, were recognised by Mr. P. R. H. St. John. The Yertchuk was, perhaps, the most interesting item noted during the day. This tree was first discriminated by the late Dr. A. W. Howitt, who referred to it as a broad-leaved form of *E. amygdalina*—his *E. amygdalina* (d)—in his "Eucalypts of Gippsland," *Trans. Roy. Soc. Vict.*, ii, 82-85, and there noted its occurrence from near Walthalla to the Delegate River. The late Mr. J. H. Maiden described the species in Part X of his "Critical Revision," and gives its range in New South Wales, as from Gosford, north of Sydney, to Nelligon on the Clyde River, within the coastal districts. Later Mr. St. John recognised it at Eltham, Warrandyte and Lilydale, and Mr. T. S. Hart found it growing near Creswick. It is not abundant at any of these places, and as it provides such good timber, that some fencing at Eltham composed of it is still sound after 34 years, it seems fated to disappear from these localities.

The ground within the forest was very dry, few flowers were in bloom and most of these had passed their best. Nothing unexpected was noticed, and the only species worth mentioning was a form of the very variable Heathy Parrot-pea, *Dalbergia ericifolia*, seen also recently near Steiglitz, in which the ends of the branchlets terminate in sharp spines. Returning to the house through a most picturesque paddock, in which some noble Manna Gums and Red Gums were growing, the party was again provided with refreshments. Dr. and Mrs. Shuter were thanked by Messrs. St. John and F. G. A. Barnard, on behalf of the party for their gracious hospitality.—C.S.S.

No botanist is more familiar with the flora of the Grampians than Mr. J. W. Audas, F.L.S., and his book, "One of Nature's Wonderlands," recently published, is a pleasant and useful companion for the field naturalist on holiday in these mountains. The volume is illustrated with a coloured frontispiece and a number of half-tone plates from photographs (chiefly of plants). One short chapter is devoted to the zoology of the Grampians. More books of this kind, dealing with special regions, would be welcomed by Victorian nature lovers.

OUR MALLEE SANCTUARY.

The scrub-roller is the Juggernaut of the Mallee, passing over animal life—the “small deer”—as well as breaking down plants. Before its advance birds and animals must retreat, losing both home sites and hunting grounds. Birds suffer most, since many nests, containing eggs or broods, are crushed by the big rollers. Year by year the incult area shrinks, as the wilderness is transformed into wheatfields.

Only the true desert is safe from encroachment—the region of desolation, where great dunes of white or grey sand lift their shoulders like waves uncrested with foam, and held motionless, mysteriously. The Mallee lands of Victoria, wherever wheat will grow, to wheat will be given over, and eventually the native fauna and flora will be homeless, beyond the boundaries of the desert, and areas that are reserved as sanctuary.

Half a million acres, permanently reserved in natural state, would ensure the survival, in fair numbers, of Mallee plants and animals that should be saved, since many species are unique, or of very special interest to botanist, biologist, and the field naturalist, who desires that no Australian native thing should disappear completely. We can hope for no such generous portion of the Mallee, but, at least, we have, in Wyperfeld Park, a “pocket” sanctuary. Between Yapeet and Pine Plains, 25,000 acres has, for some years, been permanently reserved, and recently arrangements were made towards better guardianship of this wild Park. It is, of course, unfenced, and, lacking funds, the committee of management is unable to appoint rangers to patrol Wyperfeld. Now grazing rights are to be granted, and the holders will keep watch for raiders—bird trappers, pot-hunters and their kin.

In the past our Mallee Park has been a centre of bird-trapping, while sportsmen have taken toll of ducks within the boundaries in the shooting season. Parties in quest of fledgling parrots and cockatoos were wont to visit Wyperfeld, and depart with scores or hundreds of victims—doomed to captivity. One day, on the shore of Lake Brambruk, I saw a bird-trappers’ camp. The owners were absent, but cooped in tins and boxes were many miserable young

birds, including Regent Parrots, or "Smokers," *Polytelis anthopeplus*, and other protected species. The police were informed, but when a trooper reached Brambruk the raiders had gone. It is not easy to "trap" a bird-trapper, who is flouting the game laws.

Wyperfeld is the nesting headquarters of Regent Parrots in Victoria, while the Major Mitchell, or Pink Cockatoo, *Cacatua leadbeateri*, by no means a common bird, breeds there too. Other species of parrots more abundant than the Regent are tenants of the Park area. The Loran, *Leipon ocellatus*, occurs there, too, and perhaps a bird list with 100 names could be compiled for Wyperfeld. It is, therefore, a bit of Mallee country well suited for sanctuary, and, while it remains as it is to-day, we should be thankful. May none of its wildness ever wilt, touched by the hand of progress.

Of Wyperfeld for botany I am not competent to write, beyond giving an opinion that the area is representative. There are lakes—one of fair size—and, in a year rich in rainfall, the Outlet Creek flows through the Park and fills them, rarely to an overflow; you may see on the tree trunks the tide marks of forgotten flood-seasons. The course of the creek is marked by river-gums. Then there are dead and living eucalypts in the lakes, and on dry land, as a frame about them. The cockatoos and parrots nest in tree-hollows: some veteran gums provide home-sites for nearly a dozen pairs of birds; others for two or three only. In the treeless tracts, and on the Pine-ridges, one notices familiar Mallee wild-flowers. When I was there, on October days, the lure of blossoms was strong enough to divert me for a while from bird observing; bushes were alight with flowers, and of lesser plants there seemed to be a generous variety.

Not a great area, 25,000 acres, for a National Park—one quarter the size of Wilson's Promontory reserve; yet it is a microcosm of the Mallee, and every Victorian naturalist should visit it in spring or early summertime, if possible, and when the lakes are nearly brimming. It's worth the journey from Melbourne just to see Regent Parrots in their nesting haunt. These are noble birds, happily named anew, for Regent surely is a better title than "rock pebbler," or "smoker." The male, in the prime of plumage, flies in sunshine as a golden bird. And in shadow even, with no gleam of illusion, he is beautiful in olive and greenish-yellow, with a tail not really black, but iridescent, and a fine scarlet bill. The female has duller plumage.

Wonga Park we called our Mallee reserve, until we remembered that another area in Victoria has prior right to the musical first word of that title. Rather a pity, for Wyperfield is much less pleasing, and Wonga is the name of an Australian pigeon, whose call notes echo sometimes near the shores of Brambruk—a Park lake and one of the brightest “eyes” of the Mallee. But Wonga or Wyperfield, the sanctuary is ours to have and to hold, in perpetuity, unless foolish council should prevail with some future Government.

We should, I think, all Club members will agree, make the guarding of Wyperfield Park against encroachment our concern—regard it as a natural heritage. It is second only in importance to Wilson’s Promontory, and, were it more accessible, would perhaps receive as many visitors as that familiar place—wild Nature’s own territory, by man almost unhurted.—CHARLES BARRETT.

NOTES ON FUNGUS BEETLES.

A world of insect life is associated with the various forms of Fungi, but I shall mention only some of the fungus beetles that may be found commonly in the vicinity of Melbourne.

The bracket-like Polypori, particularly the large white species that grow upon the Eucalypts, provide homes for many handsome little beetles belonging to the family Erotylidæ. Perhaps the commonest of these is *Thallis junthina*, some 3-16 inch in length and of a rich greenish-blue colour. I have, on occasions, seen huge fungi completely riddled by this species, and it is usual to find larvæ, pupæ, and the mature insects in one plant. Another species, of about the same size as *T. junthina*, but differing from it in being dull red-yellow and bluish-black, is *Thallis vinula*. This beetle also is fairly abundant in Polypori. Some larvæ, feeding in a fungus, that I had confined in a large tube left their natural food and attacked the cork, reducing the greater portion of it to dust. Two large species, which are more rarely found, are *Thallis insueta* and *T. melancholica*, the former yellowish-red and black in colour, and the latter, as its name somewhat implies, of a dull blackish hue. In all, seven species of the genus have been met with by me within a 40 miles radius of the city.

The mouldy fungus growths generally found under logs in damp situations frequently yield some delightful little beetles belonging to the family Scaphidae. These may be readily recognised by their generally oval form, terminating posteriorly in a sharp point. The largest, and best known, is *Scaphidium quadripustulatum*. This species is a little less than 3-16 inch in length, has two black spots on its prothorax, and four lighter-coloured markings on its elytra. Most of the smaller species belong to the genus *Scaphisoma*, some of them being less than 1 mm. in length, but frequently they are beautifully marked.

The toadstools often shelter several species of weevils and coachhorses, *Staphylinidae*. Sometimes toadstools are found with the gills almost "alive" with Staphylinids.

One of the largest and finest of the fungus beetles must be looked for in those brown-topped, yellow-fleshed fungi, that are of a slushy nature, and commonly grow beneath pine trees. This beetle is *Onthophagus dummingi*, of the family Scarabidae. So far as I know, it is the only species of this large dung-eating genus that favours rotten fungus. It is a dumpy beetle of a uniformly shining black colour, and sometimes nearly $\frac{1}{2}$ inch in length. It is readily distinguished by the character of the male, which has the prothorax continued over the mouth parts in the form of a long and strong horn, and the clypeus furnished with a more or less upright, though much smaller, horn. Among other families of beetles rather frequently met with in fungi may be mentioned—Nitidulidae, Coidae, and Cryptophagidae.

Any fungus showing signs of being attacked by insects is worth bringing home to be placed in a covered bottle, for many most interesting forms of life may be easily reared from it.—F. E. WILSON.

"QUERY" PARCELS OF PLANTS.

Any member desiring at any time to ascertain the names of any native plants is invited to send specimens, addressed to the Club at the Royal Society's Hall, when they will be duly determined by one or another of the members more particularly interested, and a list of the names returned. Each specimen must have a number attached, and duplicates, with corresponding numbers, should be retained by the sender.

SOME OCTOBER BIRD NOTES.

The following notes were made in three different localities — Ashburton, Melton, and Mooroolbark — which I visited frequently in October last. Fine, warm weather prevailed during the month, and bird photographers enjoyed numerous opportunities of obtaining good pictures. The subjects also were more varied, for some inland species came south and nested freely around Melbourne.

ASHBURTON.—The Sordid Wood-swallow, *Artamus sordidus*, arrived here much later than in other years. On October 1 a few were seen soaring. These flights generally are made on the birds' arrival, or just prior to their departure in Autumn. For the first time for many years a pair of Gray Thrushes, *Colluricincla harmonica*, succeeded in rearing a brood at Ashburton. On October 1 the nest was found, concealed in a tangle of bushes, and containing three eggs. Ten days later the young were hatched, and by the 24th they had left the nest and were able to fly well. On the 24th a nest of the Tawny Frogmouth, *Podargus strigoides*, was located, on a large horizontal limb of a box tree. Ten days later the two eggs had disappeared, probably they were taken by one of the many parties of boys, who regularly visit this part in quest of eggs. A nest of the Black-and-White Fantail, *Rhipidura malacilloides*, containing the unusual clutch of four eggs, also was robbed. In the topmost branches of a tall box sapling a pair of Crested Shrike-tits, *Falcunculus frontatus*, had just commenced to build a nest on the 15th, and a few days later it appeared to be completed; however, on the 29th, portion of a broken egg-shell was found on the ground beneath the nest-tree. It was evident that during a wind storm the eggs had rolled out of the nest. The birds were not seen near the nest again, and a few days afterwards had moved to the north end of the paddock. Owing to dry conditions in the northern parts of Victoria, several species moved south towards the sea coast. Among birds that arrived in large numbers were White-browed Wood-swallows, *Artamus leucorhynchus*. A few pairs were first noticed on the 24th, but soon there were hundreds. Immediately on their arrival they commenced to nest. The

coming of these birds caused the Sordid Wood-swallow to go elsewhere; the two species do not appear to like each others' company. A White-shouldered Caterpillar-eater, *Campephaga humeralis*, was seen on the 28th, and on the same day a pair of Rufous Song-larks, *Cinclorhynchus rufescens*, took up their abode in the same locality as that "selected" by a pair in 1923.

MELTON.—The dry ridges along the Deep Creek have always been a favourite haunt of a large number of species during this time of the year. The beautiful Yellow-bellied Honeyeater, *Phylotis auricomis*, predominates, and on one afternoon four nests were found, all placed among elements in flower. Efforts to photograph the parent birds at two of the nests containing young proved unsuccessful, as the birds were timid and would not approach within several yards of the camera. On the 11th an Australian Goshawk, *Astur approximans*, could be seen sitting on its nest more than 50 feet from the ground, in a tall Eucalypt. This nest has had many tenants in its time. Once it was used by a Tawny Frogmouth, then a pair of Goshawks reconstructed it. Later, in the same year, a White-fronted Heron, *Notophaga nova-hollandiae*, flattened it out, and laid four eggs. In the following year the Goshawks again rebuilt it, and they have retained ownership since. A few miles down the creek the shrill cries of another Goshawk were heard in some tall timber, but its nest was not located.

Red-backed Parrots, *Psephotus haematonotus*, were often seen in pairs searching for suitable nest hollows. Like most parrots, these birds seldom commence nesting in southern Victoria before October. Another common bird of this part is the Red-tipped Pardalote, *Pardalotus striatus*, whose monotonous note is heard throughout the day. A few pairs nest in small hollows in trees, though a tunnel in a river-bank is their usual nest-site. Many of these burrows are found in the banks of the Deep Creek. Brown Hawks, *Hieracidea horreorum*, are numerous still on the open plains between Sunshine and Melton, where, from the train, as many as half a dozen may be seen in different spots.

MOOROODUARK.—The scrub birds in this locality usually are early breeders, and this year proved no exception, as nests of several species were found to contain young at the beginning of the month. A nest of the White-eared Honeyeater, *Phylotis leucotis*, was ready for eggs at the end of September. A fortnight later, however, there was only one egg in the nest, which appeared to be deserted, and was

THE SPIDER, *ÆCOBIUS NAVUS*.

This little spider, 1-10th of an inch in length, is the only known representative of the family, *Æcobiidae*, in Australia. Only 15 species have been described, all belonging to the one genus.

Æcobius navus has been recorded from the United States of America, Venezuela, New Caledonia, Japan, Australia, and the islands of the Atlantic. Its wide distribution has been attributed to the agency of commerce. The late W. J. Rainbow recorded it for Sydney—a specimen was collected



ÆCOBIUS NAVUS (Magnified 11 diam.)

on the Australian Museum Building. Dr. R. H. Pulleine, of Adelaide, found a specimen (which I have photographed through the microscope), on a wall of his house, whilst I have collected it on the walls of my own house, opposite the St. Kilda Town Hall. Evidently it is well distributed in Australia.

The fact that this spider is found in houses suggested the generic name—from the Greek *oikobios*-house-dweller. The web can easily escape notice. Measuring about one inch,

being pulled to pieces by other birds needing material for their own nests. Some years ago Coachwhip birds *Psophodes crepitans*, were fairly numerous in pairs in this district, particularly along the Olinda Creek; but with the clearing of the scrub they have become scarce. The Ground-bird, *Cinclosoma punctatum*, too, is rarely seen now, though a few years ago several pairs were known to exist in certain paddocks.

Early in the month a few Caspian Terns, *Sterna caspia*, and numerous Silver Gulls, *Larus novæ-hollandiæ*, were much in evidence on the Yarra River, but disappeared as the nesting season approached. The Gulls also have vanished, all but a few, that may yet be seen hawking over the Yarra or standing on the bank of the Maribyrnong River at Footscray.—D. DICKSON.

LAND MOLLUSC NEW FOR VICTORIA.

During a recent visit to the Mallee district, Mr. Charles Barrett spent some time searching for land shells, but, owing to the continual dry weather, little success was attained—three species alone appearing. However, one of the forms provides an interesting record for Victoria. The shell referred to is *Thersites jervisensis*, Q. and G., sp. From Jervis Bay, N.S.W., this was described as *Helix jervisensis*, by the French naturalists, Quoy and Gaimard, in *The Voyage de l'astrolabe, Zool. Mollusques*, 1832, vol. ii, p. 126, pl. and figs. 18-21. With such well-executed figures, one may readily identify the species. The locating of this mollusc, so far south, is rather an interesting extension to the already wide distribution. The late Dr. J. C. Cox remarks: "There are many varieties of the species. In New South Wales it is almost confined to the eastern watersheds. It first begins about Eden, north of Liverpool Range, and extends all the way up the coast, even to Port Denison, Queensland."

One specimen only of this form was obtained by Mr. Barrett, on a hill-slope near Stony Creek, a tributary of the Genoa River. The dimensions of the shell in mm. are: Length, 18; breadth, 16; height, 14. A useful recognition mark of *T. jervisensis* is the carination on the body-whorl. Hitherto, Victoria has been credited with a poor representation of land mollusca, particularly in the larger forms. The writer is confident, however, that, with a little diligent search, further species await discovery.—C. J. GABRIEL.

it is, as a rule, spun over small depressions on walls or in angles. Beneath it the spider lurks, running away, when disturbed, with remarkable rapidity.

The main characteristic of this family of spiders is the position of the eyes. Unfortunately, the photograph does not show this detail, as there is so little contrast of light and shade at the ocular area, which is placed in the centre of the front half of the body—the cephalothorax. In the majority of species, spiders have their eyes situated well forward on the front portion of the cephalothorax. The only outstanding feature peculiar to this family, which is visible in the photograph, is the shape of the cephalothorax, which is broader than long, instead of being elongated.

Ecobius is a Cribellate spider, possessing the sieve plate spinneret (the cribellum), also the comb (the calanistrum), which can be found on the second last joint of the hind leg. To view this minute detail, one needs a good Canada balsam mount of the specimen and first-class optical equipment, as the calanistrum is but feebly developed.

According to Rainbow, the cocoons of *Ecobius* are flocculent, rather transparent, plano convex, fixed, and each contains seven or eight non-agglutinated eggs.—S. BUTLER.



THE BUGLE IN N.W. VICTORIA.

To those who are familiar with the form of *Ajuga australis*, R.Br., Bugle, which occurs near Melbourne, the form common in the north-west will be scarcely recognisable as the same species. The latter is an elegant plant up to 18 inches in height, well branched, covered with a whitish indumentum, and having long, tubular light-blue flowers. The species as determined by Bentham is very variable. He tells us that he had decided to set up four species till he found, from the examination of a series of 80 specimens from various localities, that he was obliged to refer them all to the single species, *A. australis*, R.Br. Near Haysdale, on the Murray, on a

small rabbit-infested hill, where the only other plants were the introduced pests, Tree Tobacco, Nettles, and Stinkwort. I found a large patch of these beautiful plants. Apparently they are not relished by rabbits.—H. B. WILLIAMSON.

MAGPIES AS PEACEMAKERS.

The White-backed Magpie, *Gymnorhina hypoleuca*, has never been famed as a peacemaker; yet, warlike though he is with human intruders, peace is enforced between bird and bird. On July 21 I noticed two Magpies attacking each other fiercely and persistently. Soon there appeared from every direction more, and still more Magpies, calling to each other as they flew. More than a dozen birds alighted about and between the combatants, one of which rose indignantly, while his adversary remained with the newcomers. They, as with deliberate intent, scattered over the grass, and commenced a carol of triumph. First one and then another repeated the same sweet phrase of song, tossing it back and forth, and joining at last in a grand chorus. Meanwhile the Magpie on the wing dropped to earth on the far side of a cyclone wire fence. The second bird hopped through the wire and the fight was resumed. One by one the peacemakers followed through the fence, and again stopped hostilities. This time both the fighters flew, and soon the whole company was lost in the blue.

Exactly one year later, July 31, 1924, I witnessed another frustrated quarrel. The combatants were most determined, and continued their fight in the air, where they were parted again and again by the equally determined peacemakers. At last they flew away, and at once the remaining birds settled in a group of pines nearby and carolled in chorus. On March 18 last still another peacemaking act was witnessed. The cause of the quarrel was visible; a sedate-looking female, which stood aside while each of the two males bent his energies on approaching her and preventing a like action on the part of his rival. The angry birds were parted, and the usual chorus of triumph came from the peacemakers' ranks. Why were two males quarrelling over one female in March?—J. GALBRAITH.

WALLABIES AND ROCK ORCHIDS.

When in East Gippsland recently Mr. V. Miller and I visited a spot far from the track of the tourist, where Rock Orchids, *Dendrobium speciosum*, grow in profusion. Summits

and steep faces of granite creek-cliffs were almost covered in the epiphytes. It was not a floral display, for nearly all the plants had finished flowering, and many were lacking in foliage. Wallabies, our guide stated, had been feeding freely on the "rock lilies." The orchid-rocks apparently are a favourite resort of wallabies, and at one meal the marsupials must do more damage than a "commercial" plant collector. But the Rock Orchids of Stony Creek are not likely to be exterminated, for even agile wallabies may not reach the scores of fine specimens that cling to a wall of granite rising almost sheer from a sloping bank, where the plants are out of reach, both from above and below.—C. BARRETT.

MORTALITY AMONG STARLINGS.

During the past three years, in the months of August, September and October, I have frequently found as many as six dead starling when walking round my garden. Two of my neighbours have had a similar experience. Although I have sometimes picked up sparrows and blackbirds, I find that the cats eat them with apparent relish, but they will not consume the starlings. With regard to the sparrows, death is accounted for by the presence of poisoned wheat in the gullets, but that does not affect the cat. I have held post mortem examinations on the starlings and failed to trace any apparent cause of death; all the birds were in good condition. On mentioning the matter to an old English farmer, he said: "You should cut out the backbone, as that is very bitter." He informed me that when he was young, hundreds of starlings were killed and eaten by the family after the bitter part of each bird had been removed. Perhaps cats have discovered that the backbone only is unpleasant eating.—G. A. KEARTLAND.

BIOLOGY OF ANTS' GUESTS.

"Fields" almost untilled are not few in the realm of entomology in Australia. One that needs more workers is that of ants' guests—not mere collecting, not descriptions of new species, but the study of behaviour, etc. A distinguished European student of ants and their guests, in a letter to a Melbourne naturalist, says: "There is no doubt that you may do very much for this science in Australia. Many dozens, or, rather, hundreds of species of coleoptera have been col-

lected there already. . . . But nobody has tried hitherto to explore their biology. The relations of these guests to their hosts are nearly unknown yet. . . . You must have constructed for this some artificial nests, where the ants feel quite well, and behave as if they were at home. There have been proposed and built different types of this kind that are all apt for observing the ants and their guests. The most simple of them are called Lubbock nests.

Ornithologists are often apt to ignore conditions of contour soil and plant cover, which are surely determining factors in the occurrence of bird life, when describing the avifauna of any particular locality.

It is, therefore, gratifying to note that a description of the vegetation of the northern end of Younghusband's Peninsula, by Professor J. B. Cleland, accompanies Mr. J. Sutton's interesting account, in the *South Australian Ornithologist* of July last, of the visit of a party to the Coorong.

Firing and grazing have resulted in the destruction of most of the scrub, which once covered the Peninsula, and the shifting sands are likely to overwhelm what remains. The total number of plants present does not probably exceed 100, and is made up of those commonly met with in the coastal belt. The most interesting of those mentioned are *Calostemma*, *Acacia ligulata*, *Kunzea pomifera*, *Melaleuca parviflora*, and *Aster subulatus*.

PHOTOGRAPHS FOR "THE NATURALIST."

It is proposed, while funds permit, to include one plate at least in each issue of the *Naturalist*. Members are invited to submit prints for consideration by the Editor and the Publishing Committee. Unusual subjects are desired, not photographs of scenery, etc. Writers of papers might submit photographs suitable for illustrations.—Editor.

All contributions for the *Naturalist*, and letters to the Editor, should be addressed:

CHARLES BARRETT,

"Maralena," Maysbury Avenue,
Elsternwick, Vic.

CORRECTION.—Page 184, *Drakaea elastica*; end of second paragraph should read: "so as to simulate another point."

The Victorian Naturalist

VOL. XLII—No. 9.

JANUARY 8, 1926

No. 505

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, December 14, 1925. The President, Mr. Geo. Coghill, occupied the chair, and about fifty members and friends were present.

LATE MR. J. H. MAIDEN.

The President referred to the death of Mr. J. H. Maiden, who, he said, although not a member of the Club, was well known to many members. He had contributed papers to the meetings, and regularly sent wildflowers to the Club shows. Mr. Coghill proposed that a letter of sympathy from the Club be sent to Mrs. Maiden and family. The motion, seconded by Mr. F. G. A. Barnard, and supported by Mr. H. B. Williamson, was agreed to in silence, members standing.

CORRESPONDENCE.

From. Hon. Sec., Victorian Bush Nursing Association, Sir James Barrett, returning thanks for donation (£55) received from the Club, and inviting the Club to nominate three Life Governors on the Association. Mr. C. Oke, Hon. Sec., said that the Club Committee had considered this matter, and had decided to nominate Miss Hilda Gabriel, Mr. Geo. Coghill and Mr. F. Pitcher. He moved that these three names be forwarded on behalf of the Club; seconded by Mr. C. Daly, and carried unanimously.

REPORTS.

Reports of excursions were given as follows:—Eltham, Mr. W. C. Tonge; Frankston, Mr. H. B. Williamson; Bunyip, Mr. Williamson; Kororoit Creek, Mr. A. E. Rodda; Sherbrooke Gully, Mr. E. E. Pescott; Lilydale, "Ruddocks," Mr. F. Chapman.

A vote of thanks to Messrs. F. Thomas, M.A., and Mr. Holgate for use of cars and hospitality to excursionists to Bunyip was carried unanimously.

GENERAL.

The statement that motor cars were entering the National Park at Sherbrooke, and approaching the falls was discussed

by several members. Mrs. C. Page moved that the matter be left in the hands of Mr. Barnard and the Secretary, to make, on behalf of the Club, a strong protest to the authorities in charge of the Park against cars having access to the reserve. Seconded by Mr. Williamson, and carried.

PAPERS.

1. By Mr. F. Cudmore.—“A Complete Corallum of the Fossil Coral, *Thamnastræa sera* (Duncan).” The author gave an account of the finding of the Corallum in the fossil-beds at Table Cape, Tasmania, and briefly described this interesting “find.”

2. By Mr. J. A. Ross.—“The Amœbæ and Their Structure.” The author stated that he did not accept the definition of the structure of the Amœbæ, as given in most of the text-books. He thought that they had a defined pellicle, and that the ectoplasm and endoplasm, although not clearly differentiated one from the other, were really distinct parts of the animal, and were not interchangeable. The paper contained an account of numerous experiments and observations, and conclusions arrived at.

Mr. W. Stickland spoke of Mr. Ross's work on the Amœbæ, discussing the points on which he differed from the writers of the text-books.

Mr. Williamson made some remarks on collecting and preserving ferns, and recommended the study of the plants to members who were desirous of doing useful work in the field of botany. He then gave a brief outline of the classification of the ferns, illustrating his remarks with a number of drawings.

EXHIBITS.

By Mr. F. Chapman: Christmas Bush, grown at Balwyn; Fossils from Lilydale, *Romingeria* (coral), *Strophonella englyphoides*.

By Mr. F. Cudmore: Corals, *Plesiastrea urvillei*, from Beaumaris (recent).

By Mr. C. Daley: Native axe from Wongaara, Great Ocean Road; flint core, with chipping edge, from Kennet River, Great Ocean Road; Leaf impressions in shale (Jurassic), from Louise Falls, Grany Creek, Great Ocean Road.

By Mr. J. A. Kershaw: Views of the National Park, Wilson's Promontory.

By Mr. A. E. Rodda: Fruits, leaves and aerial roots of Mangrove, *Avicennia officinalis*, from Kororoit Creek, star-

fish, sea-urchins, *Philine aperta*, with internal shells and gizzard plates, all from Racecourse Beach.

By Mr. H. B. Williamson: Specimens gathered at Bunyip, specimens of ferns, *Hymenophyllaceæ*.

The meeting closed with the usual short conversazione.

EXCURSION TO ELTHAM.

About 20 members visited Eltham on November 14. After walking a mile along the road towards Glen Park the party turned into the paddocks and crossed the creek. The call notes of Rufous Whistlers, *Pachycephalus rufiventris*, Grey Thrushes, *Colluricincla harmonica*, Cuckoo Shrikes, *Graculus melanops*, several species of Honey-eaters and Tit-Warblers, were heard. The first halt was at the recently-made nest of a pair of Olive-backed Orioles, *Oriolus sagittatus*. Several pairs of these birds come from the north every spring, and nest near their old home-sites. The nest examined was on the fork of the swinging bough of a Box sapling near the creek, and contained three eggs. The eggs were hatched on November 16, sixteen days after the last egg was laid.

Two Regent Honey-eaters, *Meliphaga phrygana*—flocks of which have favoured Eltham with their presence for several seasons in succession—were putting the finishing touches to their nest, high overhead, in a fork of a Stringy-bark tree. Not many yards away a pair of Butcher-birds, *Cracticus destructor*, had nested in a sapling. We walked on up among the timber, where the White-winged Choughs, *Corcorax melanorhamphus*, had their mud nests. Working back to the creek, we passed another Orioles' nest, in a swinging sapling; the young birds had recently flown. Close by, on the horizontal branch of a tall White Gum, was the nest of a pair of White-fronted Herons, *Nalophrys nova-hollandia*. Two young had been reared, the third having fallen on misfortune. This nest has been used for two years in succession, being renovated this season.

Among the timber again, on the gully sidings, we observed a nest in a Stringy-bark containing three fully-fledged young Choughs. They were feeling the heat and were anxious to try their wings; two of them came to the ground. On the fork of a Stringy-bark branch a Tawny Frogmouth, *Podargus strigoides*, and two young ones, nearly fledged, were sitting

motionless. On the way to Eltham Heights, and the leader's house, we inspected the nesting-hole of a pair of Spotted Pardalotes, *Pardalotus punctatus*.

W. C. TORREY.

EXCURSION TO FRANKSTON.

On November 21 about a dozen members travelled by train to Frankston, and were joined there by the Rev. G. Cox and 18 juveniles, members of the Mornington Naturalists' Club. The walk along the railways towards Langwarrin proved interesting. Four species of Guinea-flowers were gathered, but not all in bloom. Four species of Sundew also were found, in the moister places. Both Dianellas and the beautiful Golden Spray were admired. The two Bladderwerts and the Tall Yellow-eye were seen, but no orchids were reported to the leader. The feature of the outing was the presence of the juveniles, and their keenness was admirable, considering that they had been out all day. Mr. Cox is to be congratulated on the fine work he is doing at Mornington. He gives up many of his Saturdays and some of his evenings to the young folk, and has instilled into his pupils a love for the things of Nature.

H. B. WILLIAMSON.

EXCURSION TO KOROROIT CREEK.

Owing doubtless to hot weather on November 28, and the claims of another excursion, only three members took part in the outing to Racecourse Beach and Kororoit Creek. The tide had receded, and an hour was spent in exploring shallow pools. Many molluses, including a species of *Philina*, were noted. The tracks of such species as the Sea-snail, *Natien*, and the Bubble-shell, *Bulla*, could be followed, and the creatures discovered, slowly progressing. Starfish, sea-urchins, several species of crabs, prawns, and the aggressive sea-lice were observed. Little flounders, coloured exactly like the sandy bottom, sprang from invisibility and sometimes sought shelter beneath our feet. About 20 Sea-curlews, *Numenius cyanopus*, were seen, in a flock, and with them a number of Sandpipers of two species, too distant for certain identification. At the sea-edge were two Black Swans, as well as Silver Gulls, Terns and Cormorants.

Leaving the beach, we crossed the low, marshy flat to the creekside. This flat is covered mainly with large bushes of Samphire or Glasswort, *Salicornia*, and other saline vegetation. The spaces between the bushes were everywhere bridged

by the tough threads of a peculiar "thorny" spider (*Gasteracantha* sp.), present in great numbers. A few nests of the Tang, *Ephelamina albigrons*, were found, and several of the birds were seen flitting, in jerky flight, from bush to bush. In the quiet water of the creek a Great Crested Grebe, *Podiceps cristatus*, was swimming and diving. A number of Mangrove trees, *Avicennia officinalis*, still remain on the eastern side of the creek, surrounded by a stubble of upright aerial roots, whose length is governed by the rise of the tide. On the opposite bank a pair of Spurwinged Plover, *Lobityx novae-hollandiae*, were seen. Other birds noted were Dotterels, Skylarks, Pipits and Goldfinches. A feature of the return journey was the large number of brown butterflies, seeking sheltered nooks in anticipation of the hurricane that burst upon us half an hour later, when we had reached the Seaholme station.

A. E. RORRA.

EXCURSION TO BENYIP.

On November 28 eight members were met at the Bunyip railway station by Mr. F. Thomas, M.A., and Mr. Holgate, who motored to Mr. Thomas' home, about two miles north of the township. After an inspection of the garden, where the presence of native plants testified to the owner's Australian spirit, the party were driven a mile further north, and then an enjoyable walk westward brought them to the foot of Mt. Cannibal. The ramble led through country where the Short and Long Purple Flags, *Patersonia glauca* and *P. longiscapa*, were found together, and representatives of the Lily family were much in evidence, Pale Grass Lily, *Casia parviflora*, the beautiful Fringe Lily, *Thysanotus tuberosus*, the Tufted Lily, *Stypandra caespitosa*, and the Smooth Flax Lily, *Dianella laevis*. The Swamp and the Spreading Bush Peas, *Pultenaea Weindorferi* and *P. Readeriana*, and the Pale Wedge Pea, *Gompholobium Huegelii*, were also noted. Mt. Cannibal was then ascended. Large flat granite rocks formed a character of the summit. Descending towards Garfield, the Cannibal Creek was reached, where the Broad-leaf Water Milfoil, *Myriophyllum amphibium*, was gathered. This plant has not yet been recorded for the South. On the lower slopes of Mt. Cannibal the peculiar Wiry Spear Grass, *Stipa Muellieri*, was common. It is a tall grass, with rarely more than one spikelet in its flower head. The Eucalypts noted were Swamp Gum, *E. uvula*, Mountain Grey Gum, *E. goniacalyx*, Peppermint

Gum, *E. australiana*, Messmate, *E. obliqua*, and White Stringy Bark, *E. eugenoides*. Seedlings of the last-named were found on the dry hill-top, showing the interesting ligno-tubers well developed.

H. B. WILLIAMSON.

EXCURSION TO SHERBROOKE GULLY.

A party of six took part in the full-day excursion on December 5. Sherbrooke Gully was approached by the hill-road from Teeoma station, whence the magnificent panorama, from Beaconsfield, Westernport to Port Phillip, was viewed. Many birds were observed in the Gully, others were noted by their calls—the Coachwhip Bird, *Psophodes crepitans*, and the 'Bell' Miner, *Manorhina melanophrys*. Flowers were scarce; the chief ones noted being the Clematis and Christmas-bush, *Prostanthera*. Nothing of special note was seen, the day being a quiet one of general observation.

E. R. PISCOTT.

EXCURSION TO RUDDOCK'S QUARRY, MIDDALE.

Thirteen members and friends visited Ruddock's quarry on the afternoon of December 12; and an hour was spent collecting the Silurian fossils which are here very abundant. The details of a previous excursion (see *Victorian Naturalist*, vol. XXXVIII, p. 122) give a good idea of the richness of this mudstone deposit. On the present occasion we found such corals as the parasitic *Pleurodictyum*, the rambling *Romingeria* and the turbate *Lindstrœmia*. The lamp-shells comprised the genera *Orthis*, *Strophonella*, *Spirifer*, *Leptana* and *Nucleospira*. Some interesting bivalves found included *Grammysia* and *Goniophora*. Of the Gastropods there were: *Bellerophon*, *Pleurotomaria*, *Murchisonia*, *Loxonema* and *Carinuroopsis*. Portions of the straight nautiloid, *Cyclaceras*, represented the cephalopods. Two examples of the ancient goose-barnacle, *Turritilepas*, were found, as a separate plate and some connected ones. And last, but not least, was a free cheek, with attached faceted eye-lobe, of the trilobite, *Phacops*. The specimens found were named on the spot, and as the leader and Mr. F. A. Cudmore, brought some illustrated papers on the fossils of this particular bed, members could see the actual figures. To several the treasures of this little quarry were a distinct surprise, and the expression of having enjoyed a pleasant afternoon was unanimous.

F. CHAPMAN.

VICTORIAN FERNS

By H. B. WILLIAMSON, F.L.S.

Part I.

Ferns have always enjoyed much popularity on account of their decorative value and the attractive appearance they present when pressed and dried. Some people consider that no garden is complete without a fernery, and many householders who cannot have a garden manage to have a pot fernery, where they can tend some of these graceful plants. And what is more restful to the eye on a glaring summer day than to wander among ferns in a shady grove? Besides those who use them for making home beautiful, there are some who delight in seeing them in their natural habitat, studying their wonderful life history and perhaps trying to classify them and learn their names. Especially to these last my notes are designed to appeal.

Of the Victorian ferns very few may not be found within 100 miles of Melbourne, and there is no reason why ferns, as objects for study and collection, should not be as popular as orchids, excepting, perhaps, the fact that the latter are found in all kinds of places, while ferns, as a rule, are restricted to the mountain gullies.

Collections of dried ferns are easily made; all that is required being a supply of newspaper between stout card covers of a convenient size, say 15 inches by 11 inches. Fronds should be placed in the portfolio as soon as picked, and pressure applied by means of two leather straps. On reaching home, the fronds should be placed between dry paper, under a weight of about 30 lbs. A little attention every two or three days is needed to transfer them to dry paper, and to see that the fronds are spread properly.

In gathering ferns, look for fertile fronds, those bearing on their under-surface reddish masses of spores. These are important for the purpose of classification. When quite dry, the ferns may be mounted in albums, or on sheets of stiff paper, either by placing gummed strips across a good many parts of the fronds, or by fastening every portion of them

down on the paper with glue, a method which makes a permanent mount, able to stand much handling. This is the method which I have found efficient for school collections, and am using with the collection of ferns that I am offering to the Field Naturalists' Club for the Library. I shall be glad to give later the details of the method, if it is desired. In mounting ferns, especially if the glueing method is used, it is important that a part, at any rate, of the frond be mounted with the under side uppermost, so that the arrangement of the fruit-masses can be studied.

In dealing with the classification, I do not propose to labour the descriptions, or to use many scientific terms. In the scientific treatment of the classification of plants, one is supposed to start with a key to the families—Natural Orders, we used to call them—and learn the characters of these. Then a key to the genera is to be used, and after that a key to the species in the same way. If I do not follow that method I hope that the sacrifice of scientific principles will be more than compensated for by the value of these notes to the novice. It would be well if Mueller's Key, Part I, were used in conjunction with these notes, and that the drawings at the end of Part II. were at hand for reference. The last 28 pages of the latter are well worth studying.

The following are definitions of some of the terms with which fern students should be familiar:—

Frond, leaf springing from an underground stem (rhizome) or from the summit of an erect trunk.

Pinna, primary division of a frond.

Secondary pinna, division of a pinna. Called a pinnule when the frond is bi-pinnate only.

Pinnule, the ultimate division of a frond or a pinna.

Sorus, pl. sori. Fruit mass or cluster of sporangia.

Sporangium, spore-case; roundish sac or pouch, holding the spores.

Indusium, Involucre, Fruit-cover, Fruit-cup; the membranous lid, cup or border over or around the sorus.

Dorsal, under-surface, away from the edge.

Receptacle, the seat of the sporangia.

The classification of ferns into families and genera is based on the nature of the sporangia, whether stalked or sessile, large or small, and on the nature of the ring, if any

is present; on the disposition of the sori, whether in lines or in roundish masses, terminal, marginal or dorsal; on the presence or absence of an indusium, and on the venation of the pinnules. The structure of the sporangia is interesting, although a hand lens is scarcely capable of revealing the detail; but as the classification sometimes depends on it, it had better receive some attention. It is seen that the sporangium is often surrounded by an annulus (ring) of thickened cells, which forms an elastic organ, which, on drying, contracts, and causes the case to be split open, setting free the ripe spores. This ring may be perfect or incomplete, horizontal, oblique or longitudinal, or absent, as in *Osmundaceæ* and *Ophioglossaceæ*.

The following is a list of the characters of the several families:—

HYMENOPHYLLACEÆ.—Sporangia sessile, placed on a bristle-like axis, in a cup-like indusium on the edge of the frond.

CYATHEACEÆ.—Tree ferns, fronds large, sporangia in roundish masses on the under-surface of the frond; indusium sometimes present.

OSMUNDACEÆ.—Ferns with thick trunks, fronds large; sori without indusium, often covering the dorsal surface of the lower pinnules of the frond.

GLEICHENIACEÆ.—Sori dorsal, sporangia few, 2 to 8 in cluster; fronds dichotomous (forked in twos).

SCHIZÆACEÆ.—Fronds with small terminal pinnules; sporangia sessile, with complete ring at the summit, no indusium.

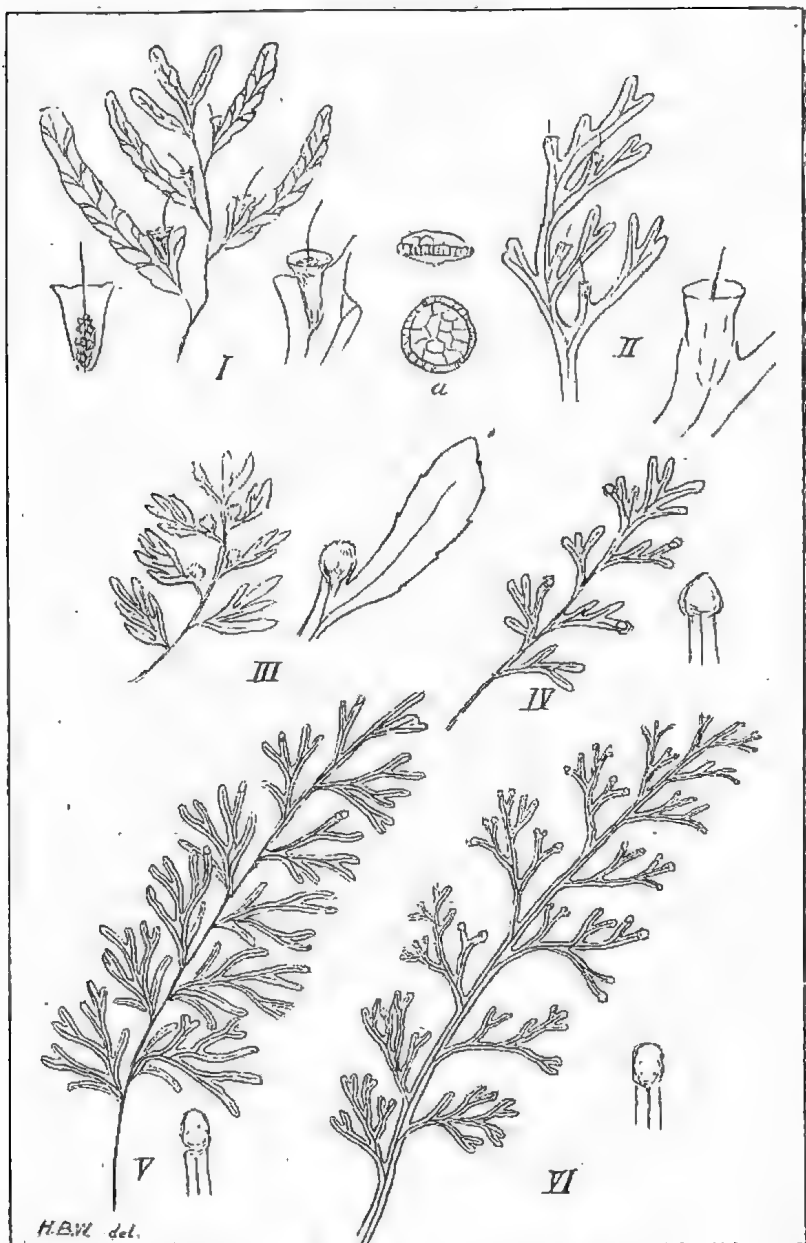
SALVINACEÆ.—Small, fern-like, floating plants, with sporangia enclosed in sporocarps (capsules).

MARSILEACEÆ.—Marsh plants, with fronds springing from creeping stems; sporangia in hard sporocarps.

OPHIOGLOSSACEÆ.—Young fronds not circinate (rolled inwards at the top). sporangia large, sessile, in two rows, on narrow, fertile fronds; no indusium.

POLYPODIACEÆ.—Sori dorsal or marginal, rarely terminal, usually stalked, some with indusium.

It so happens that the first and second families named in the Census represent the dwarfs and the giants of the fern



FAMILY HYMENOPHYLLACEÆ.

world, members of the first family being no higher than an inch or so, while the second numbers among its members plants over 60 feet high. I shall deal with the dwarfs first.

Family HYMENOPHYLLACEÆ

(Tender- or Delicate-leaved). . .

This family includes those tiny ferns which, in our fern gullies thickly clothe the trunks of tree ferns. Fallen logs and mossy rocks also may be seen completely covered with their translucent fronds, which have been likened to shiny green silk. Rarely do we see them in ferneries, for the conditions under which they grow are difficult to obtain artificially.

GENUS TRICHOMANES.

The name alludes to the bristle-like axis on which the spore-cases are set. This axis rises from the bottom of a cup-like involucre set on the edge of a pinnule.

TRICHOMANES VENOSUM, R.Br. Bristle Fern.—This is very abundant in almost every fern-gully, and is easily known by its simply pinnate fronds, the pinnæ of which are forked-veined, and by the fruit-cup being embedded in the pinna (immersed) near the base on the inner side. The cup has a short, spreading border. It occurs in New Zealand and all the States except West Australia and South Australia.

T. HUMILE, G. Forst. Short Bristle Fern.—This tiny plant has rarely been gathered in our State. The only Victorian specimen I have seen was gathered in the Dandenong Ranges in 1876, by Mr. Robt. Lucas. It has recently been reported by Mr. A. J. Tadgell, from Mt. Bogong, and among specimens brought from Mallacoota by Mr. C. Barrett. It differs from the common Bristle Fern in not having any forked veins. The fronds are not simply pinnate, but are doubly pinnatifid (segments not divided right to the mid-rib). The fruit-cup is scarcely embedded in the pinnule, and has no spreading border. It occurs in New South Wales, Asia, Polynesia and New Zealand.

GENUS HYMENOPHYLLUM.

In this genus the arrangement of the sporangia is the same as in *Trichomanes*, but the fruit axis is not exserted, and the cup has not an almost entire edge, but is bi-lobed, and sometimes deeply cleft. The lobes are not easily seen, for when the fern is pressed the lobes are pressed together.

HYMENOPHYLLUM TUNBRIDGEENSE (L.) Smith. Tunbridge Filmy Fern.—This fern is very widely spread, having been recorded from every continent and every part of Australasia, except West Australia. It is known by its pinnules being finely-toothed, and by having fruit-cups at the base of the pinnules, the lobes of the cup being also finely-toothed.

H. AUSTRALE, Willd. Austral Filmy Fern.—This has fronds 3 inches or 4 inches long, twice or thrice pinnatifid. It has its frond-stalk winged throughout. It occurs in Asia, Polynesia and New Zealand, as well as in all States of Australia, except West Australia and South Australia.

H. PLABELLATUM, Labill. Shining Filmy Fern.—This is known from the preceding by its stalk being filiform throughout, and not winged, and by its pinnae being more fan-shaped. Its distribution is the same, except that it is not recorded from Asia.

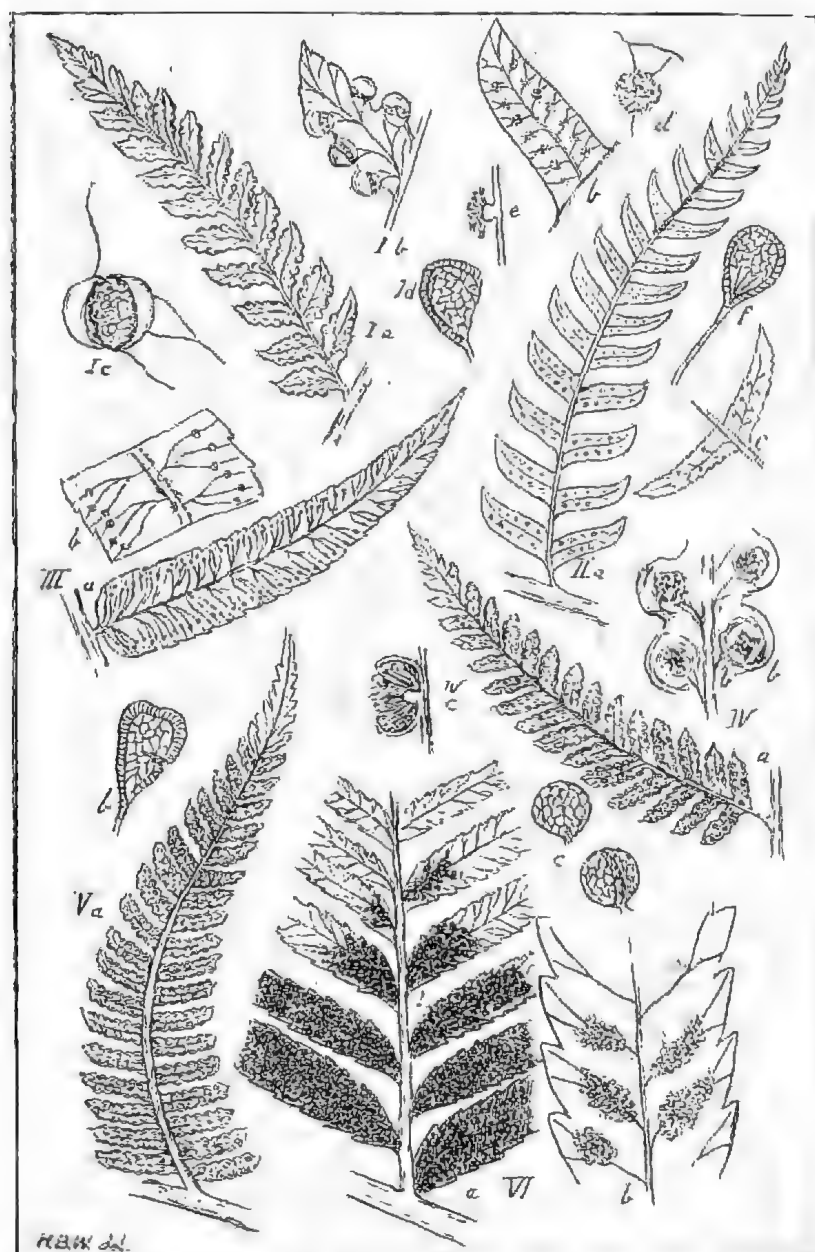
H. RARUM, R.Br. Rare Filmy Fern. This fern is not included in the Census, but specimens collected by Mueller at Apollo Bay—no date—prove to be this rare species. I have some doubtful specimens gathered at Lorne in 1922 by Rev. A. C. Gates. It is common in New Zealand and Tasmania, and has been recorded from South Africa and South America. Its fronds are narrow and simply pinnate, the pinnae being 2-5-lobed. If one of the pinnae of *H. australe* were lengthened out and provided with a filiform stalk it could easily be mistaken for *H. rarum*. Its delicate pendent fronds, on capillary stalks, may be looked for on fern trunks in the Otway Ranges.

Family CYATHEACEÆ.

Genus *DICKSONIA*.

In Victoria all the six species which develop tall trunks belong to the family Cyatheaceæ. The genus *Dicksonia* is distinguished by having sori roundish, marginal, and surrounded by an indusium, formed partly by the incurved margin of the frond, and partly by an inner membranous valve.

D. ANTARCTICA, Labill. Soft Tree-fern.—This is our great tree-fern, reaching to a height of 30 to 50 feet, and with a trunk of several feet in diameter, including a mass of matted rootlets. This elegant fern, together with the species next to be mentioned, impresses upon our shaded forest glades a



Family CYATHEACEÆ (I—V); Family OSMUNDACEÆ (VI)

tropical grandeur and grace of foliage which Eucalypts cannot give, but the tall gum trees play their part in forming and preserving the fern gullies by providing shade and conserving moisture, and it is only in the country of the giant gums that tree-ferns flourish and support their dwarf allies.

Genus *ALSOPHILA* (grove-loving).

This genus is easily known by the round fruit-masses, set well away from the edge of the pinnule, and by the absence of an indusium.

ALSOPHILA AUSTRALIS, R.Br. Rough Tree-fern.—This is the only other tree-fern common in Victoria. It is not quite so robust, but is generally taller than the *Dicksonia*, and is often seen on hillsides where there is a very good rainfall. Along the Gippsland railways one may see specimens of this fern up to 30 feet or 40 feet growing among the potato crops, but I am not optimistic as to the long continuance of the species if deprived of its natural shelter by the settlers of the forests.

A. REBECCAE, F.v.M. Wig Tree-fern.—Recently a specimen of this fern, collected by Mr. Sayer some years ago at the Benm River, East Gippsland, was found in the National Herbarium. It had been determined by the late Prince Bonaparte. It is very distinct from its congeners, having its secondary pinnæ undivided, simply serrate. As this fern is a Queensland species, and has not been found in New South Wales, the re-discovery of it at Benm River will be looked forward to with interest.

A. COOPERI, F.v.M.—A specimen collected near Cape Otway (C. Walter) was determined as *A. Cooperi*. This species was assigned by Douin to a variety of *A. excelsa*, which approaches *A. australis* very closely in foliage, but is easily distinguished by its stem. I consider that a determination of this species on an examination of a small frond segment cannot be accepted, so that the addition to the *Census* is in error. I may say that Mr. Morris, of the Herbarium, agrees with me in this.

Genus *CYATHIA*.

In this genus the sori are round, and set away from the edge of the frond, as in *Alsophila*, but they are provided with a cup-shaped indusium, which, in the young stage, is almost closed, and later bursts open, and leaves a cup or complete ring round the sori.

CYATHEA CUNNINGHAMII, F.V.M. Slender Tree-fern.—This fern is remarkable for its slender stem, which is sometimes 40 feet high and only $3\frac{1}{2}$ inches in diameter. It is common in New Zealand and Tasmania, but it has not often been gathered in our State. In 1883 Mr. John Baldey sent fronds to the Herbarium from "a creek that rises in Arthur's Seat, and flows into the sea near Cape Schank." He described it as having a stem about 4 feet high and 2 inches in diameter, clothed to within a few inches of the ground with the persistent dead fronds. In 1903 I noticed a few on the roadside near Mt. Sabine. They were about 35 feet in height, and not more than 4 inches in diameter. Settlers called it Maori Fern. When first sent in by Mr. David Boyle, in 1879, from the Eastern part of the Dandenong Ranges, Baron von Mueller named it *Cyathea Boylei*, but afterwards identified it with the species he had described in the *Southern Science Record* as *C. Cunninghamii*.

Mr. P. R. St. John informs me that 30 years ago specimens of this fern from the Dandenong Ranges were sold in the Melbourne streets as the rare *Cyathea Boylei*; one explanation of its rare occurrence now in that district.

C. MEDULLARIS (Forst.), Sw. Black Tree-fern.—This is one of the kings of the fern family, reaching, in New Zealand, a height of over 60 ft. It is more robust, with larger and coarser fronds, and a thicker, black stem. The fronds are often seen extending over 36 feet—truly a "monarch of the grove." It may be known by the shiny black bases of the frond stalks persistent at the summit of the stem. It is found in Tasmania, New South Wales, Asia, Polynesia and New Zealand. A few specimens have been seen in the Otway Ranges.

Family OSMUNDACEÆ.

Genus TODEA.

TODEA BARBARA (L.), Moore. King Fern.—Although not counted among tree-ferns, since it does not produce a tall trunk, yet it is one of the giants of the fern gullies, for what it loses in height it makes up in breadth, the stem often exceeding 4 feet in diameter. Colossal specimens, weighing over a ton, without the fronds, which were very large, and numbered over a hundred, have been seen in the Genbrook Ranges. The plant belongs to a small family, which is distinguished by its sporangia having no ring. Its fronds are of a tough and firm texture, and the sori are crowded on the

forked veins of the lower segments of the lower pinnae, sometimes covering the whole of the lower surface of the segment. It is distributed through South Africa, South-east Australia and New Zealand.

EXPLANATION OF ILLUSTRATIONS.

Family HYMENOPHYLLACEÆ.

Fig. I.—*Trichomanes venosum*, frond and fruit cup.; (a) sporangium of *Trichomanes* and *Hymenophyllum*.

Fig. II.—*T. humile* and fruit cup.

Fig. III.—*Hymenophyllum tanbridgensis*, and fruit cup.

Fig. IV.—*H. rarum* and fruit cup.

Fig. V.—*H. flabellatum* and fruit cup.

Fig. VI.—*H. australe* and fruit cup.

Family CYATHEACEÆ.

Fig. I.—*Dicksonia antarctica*; (a) pinna; (b) pinnule; (c) indusium showing sporangia; (d) sporangium.

Fig. II.—*Alsophila australis*; (a) pinna; (b) pinnule enlarged; (c) pinnule showing a serrate form; (d) sorus; (e) side view of same; (f) sporangium of *Alsophila*.

Fig. III.—*A. Rebeccae*; (a) pinna; (b) enlarged portion.

Fig. IV.—*Cyathea Cunninghamii*; (a) pinna; (b) enlarged portion; (c) side view of sorus of *Cyathea*.

Fig. V.—*C. medullaris*; (a) pinna; (b) sporangium of *Cyathea*.

Family OSMUNDACEÆ.

Fig. VI.—*Todea barbara*; (a) portion of pinna; (b) portion of pinnule enlarged; (c) sporangia.

A NOTE ON PHILINE.

The mollusc *Philine* was found in numbers on the submerged sand at the Racecourse Beach, near Seaholme, on the occasion of the Club excursion on November 28. The description given by S. P. Woodward in his "Manual of the Mollusca" of the type species, *Philine aperta*, applies very closely to the subject of this note. It reads as follows:—"Shell internal, white, translucent, oval, slightly convoluted, spire rudimentary. Animal pale, slug-like, mantle investing shell. Head oblong, eyeless, foot broad, lateral lobes large but not enveloping. Gizzard with three longitudinal shelly plates." The movements of this creature are so slow as to be almost imperceptible. Held in the hand it appears to be inanimate, but after a while is seen to have changed its form, becoming less flattened. It is very conspicuous on the sand, and must be distasteful to birds and fish, otherwise it could not exist so plentifully.—A. M. RONDA.

THE FOSSIL EUCALYPTUS RECORD

By FREDK. CHAPMAN, A.L.S.

Although J. H. Maiden, in his "Critical Revision of the Genus *Eucalyptus*" (see vol. VI, part 5, 1922, p. 244), makes no claim to be a palaeobotanist, yet his great knowledge of the genus *Eucalyptus* gives a distinct value to his opinion on the much-discussed question as to the occurrence of that genus in fossil deposits elsewhere than in Australia. Those who are interested in Australian Tertiary palaeobotany will find it an advantage to read and weigh Maiden's critical remarks on the foreign records of *Eucalyptus*, which will be found in the part of his work quoted above. Furthermore, the summary of recorded Australian fossil species, by Ettingshausen and Deane, are there presented in an extremely handy form, and Maiden has spared no pains to make his quotations complete to the date of publication (see Crit. Rev., vol. VI, part 1).

Regarding Ettingshausen's reference to his species of the Queensland and New South Wales fossil Eucalypts as of Cretaceous age, Maiden quotes the arguments given by Henry Deane, and later by the writer (in this Journal, 1921), from the standpoint that the type of venation indicates a much later and fairly modern origin, and could hardly have been evolved during the earliest stages in the appearance of the dicotyledonous floras.

Of the three species of the supposed North American fossil Eucalypti, Maiden is in agreement with Professor E. W. Berry, of Baltimore, who says:—"Among the numerous Cretaceous fossils from North America now referred to *Eucalyptus*, there is not a single one that does not show characteristic features of *Eugenia* or *Myrcia*, especially of the latter, a fact greatly impressed on me in handling a large amount of recent material during my study of the American "tertiary forms." As regards the reference to what Maiden terms "the very American genus *Myrcia*," the latter rightly exercises some caution. As far as present distribution indicates, *Eugenia* is the more universally dispersed, being found in Asia, India, Australia, the East Indies, and in Central

and South America; and in this respect Berry's reference to the genus as a fossil form will be of interest to future workers.

In Part LV of Maiden's "Critical Revision," there has been brought together for the first time practically all the information about the supposed occurrence of the fossil species of *Eucalyptus* in extra-Australian localities. Added to this there is the great advantage of the excellent reproductions of figures of the leaves and fruits given by previous authors, such as Heer, Ettingshausen, Saporta, Lesquereux, Newberry and Hollick. In the explanation to the plates, Maiden has given his own notes succinctly, but none the less valuable. As, for example, under *E. Geinitzi*, Heer, pl. XLV, figs. 4-9, and pl. XLVI, fig. d.—"are certainly not representatives of *Eucalyptus* fruits;" whilst we note that authorities like Saporta and Newberry have referred Heer's *Eucalyptus* fruits to those of a conifer.

Coming so suddenly after the death of our friend and fellow worker, Mr. Henry Deane, M.A., the loss of Mr. Maiden is the more severe, since both were indefatigable investigators in the botanical world, and their places will be hard to fill.

The following is a complete list of the Australian fossil Eucalypts, of which the description of the original authors is quoted by Maiden in his "Critical Revision;" besides which he gives reproductions of the original figures. For the age of the beds the present writer is responsible:—

- Eucalyptus Pluti*, McCoy. Deep Leads, Daylesford, Victoria. Pliocene.
E. Kayseri, Johnston. Mount Bischoff, Tasmania. Pliocene.
E. Milligani, Johnston. Macquarie Harbour, Tasmania. Pliocene.
E. Delftia, Ettingshausen. Dalton, New South Wales. Miocene.
E. Diemenii, Ettingshausen. Emmaville, New South Wales and Arcona, Central Australia. Miocene.
E. Hayi, Ettingshausen. Emmaville, New South Wales. Miocene.
E. Houtmanni, Ettingshausen. Emmaville, New South Wales. Berwick, Victoria. Miocene.
E. Mitchellii, Ettingshausen. Emmaville, New South Wales. Elizabeth River, Central Australia. Berwick, Victoria. Miocene.

- E. cretacea*, Ettingshausen. Darra and Oxley, Queensland. Miocene.
E. Davidsoni, Ettingshausen. Oxley, Queensland. Miocene.
E. Ozleyana, Ettingshausen. Oxley, Queensland. Miocene.
E. scoliophylla, Ettingshausen. Oxley and Darra, Queensland. Miocene.
E. Warraghiana, Ettingshausen. Darra, Queensland. Miocene.
E. precoriacea, Deane. Mornington, Victoria. Miocene.
E. Hermani, Deane. Berwick, Victoria. Miocene.
E. Howitti, Deane. Berwick, Victoria. Miocene.
E. Kitsoni, Deane. Berwick, Victoria. Narracan, Victoria (F.C.). Miocene.
E. Suttoni, Deane (olim *Muelleri*, Deane non Moore). Berwick, Victoria. Miocene.
E. Woolsii, Deane (re-named *E. Chapmani*, Deane, for supposed pre-occupation by *E. Woolsiana*, Baker). Berwick, Victoria. Miocene.

Maiden refers to provisional determinations of fossil Eucalypts from Australia as follows:—

- E. obliqua*, L'Herit. McCoy, in Prog. Rep. Geol. Surv. Vict., vol. 1, 1873. (This form appears to have been afterwards named by McCoy as *E. Pluti*.—F.C.). From Malmsbury and Daylesford. Leaves in clay, intercalated with lava or overlain by Newer Volcanic. Probably Pleistocene (F.C.).
E. amygdalina, Labill. Leaves recorded by Chapman as probably Miocene. From the Ironstone of Redruth, Casterton; coll. by the Geol. Surv., Vict.
E. melliodora, A. Cunn. Silicified wood, described by Chapman. Bruthen, Victoria. Miocene or Pliocene.
E. piperita, Sm. Silicified wood, described by F.C. Malla-coota Inlet, Gippsland. Miocene or Pliocene.
Eucalyptus sp. Leaves in volcanic tuff, Warrnambool, Victoria. Late Pleistocene.

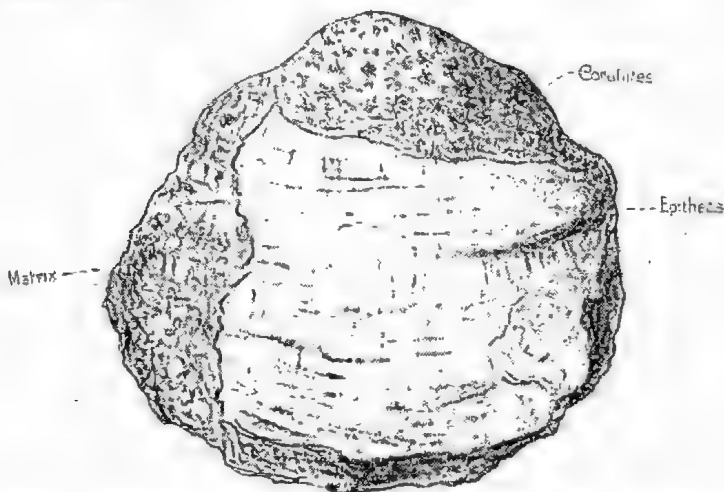
Great numbers of the Goose-neck Barnacle (*Lepas*), of small size, are to be found along the beaches about Mornington, attached to pieces of sponge, cuttlefish, wood, and all kinds of debris. These I have not noticed in this locality, previously, though the common Rock Barnacle (*Balanus*) abounds.—G. Cox.

A COMPLETE CORALLUM OF *THAMNASTRAEA SERA*, DUNCAN

BY F. A. CUDMORE.

(Read before the Field Naturalists' Club of Victoria,
December 14, 1925.)

The importance of the present specimen of the fossil coral, *Thamnastraea sera*, Duncan, which is a true reef-building coral, lies in the fact that it is a complete corallum, whereas all the previously-recorded specimens appear to be fragments. It is of considerable interest to note in this example the character of the epitheca, or outer limy covering of the coral, which appears to be quite lacking in specimens hitherto found.



Nearly Complete Corallum of *Thamnastraea sera*, Duncan.
F.C. fecit. Circ. $\frac{2}{3}$ nat. size.

The corallum, which measures $9\frac{1}{2} \times 8\frac{1}{2}$ inches in diameter by $6\frac{1}{2}$ inches in height, presents a dome-shaped appearance, the apical portion being slightly oblique. The more or less broader or flattened side of the corallum shows the best preserved surface of the epitheca. Near the apex this epitheca is abraded, and the ordinary appearance of the septation of

the corallites, as in those figured by Duncan, is clearly seen (1). The largest diameter of the corallites seen on the apical portion average about 15 mm.

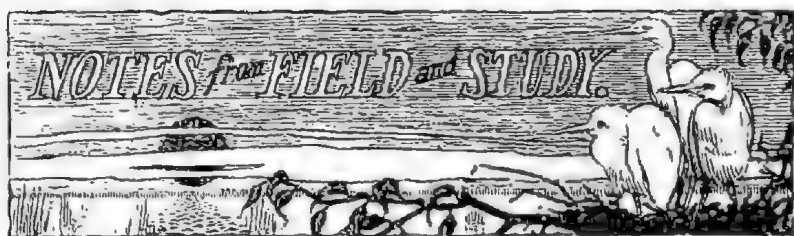
The epitheca is fairly thick, and shows more or less wavy and concentric rugæ. Under a lens the epithecal surface is seen to be finely, but distinctly, radially striate, and these striae are crossed by finer concentric lines. The corallum appears to have been bored into by perforating sponges and other boring organisms, while there are indications of attached organisms, including a small oyster and the basal part of three *Vermicularia*.

In 1875 the Rev. Julian Woods sent to Professor P. Martin Duncan a parcel of fossils from Table Cape. Woods had previously pointed out that the strata were of similar age to those of the mainland: and Duncan showed that the fossils received proved that they were from a littoral deposit and that a warmer climate must then have existed in the Table Cape area. Duncan says: "Thamnastraea, so common in the Jurassic ages, was then a reef-builder and a littoral form, and after a great number of species had been evolved, it became rare in the Nummulitic period, and died out in the subsequent geological age in the Australian region, having been probably destroyed in the European areas by the changes which ensued upon the destruction of the Eocene reefs."

About a score of different species of corals are known from the Table Cape beds. The coral-isotherm of 74 degrees passes 15 degrees too far north to allow the reef-building corals to flourish in Bass Straits. Although the region is not a coral reef area at the present day there is an interesting remnant of the coral reef fauna still existing, as shown by the quite large masses of the Astræan coral, *Plexiastræa urvillei*, Rd. et Haime, which occur, at all events, on the Victorian and South Australian coasts. Thus Howchin has recorded a block 7 feet long, 4½ feet wide and 3 feet thick; this was found in the Gulf of St. Vincent, in the course of constructing a break-water at Glenelg, on a sandy bottom 13 feet below low-water level. Some portions of the corallum were still alive, but the main mass was dead.

Occurrence: Basal portion of Crassatellites Bed, Table Cape, Tasmania. Janjukian (Miocene) age. Now in the Wall Case, National Museum; collected and presented by F. A. Cudmore. Reg. No., 13153.

(1)—"On Some Fossil Reef-building Corals from the Tertiary Deposits of Tasmania," Quarterly Journal of Geological Society, Vol. xxxii, Pt. 3, No. 127, 1876; with plates.



FROGS IN A FERNERY.

Nearly a dozen frogs are at home in my shade-house, and earn their lodging as enemies of slugs and "slaters," caterpillars, and other pests among the ferns. Several of my pets are Golden Bell-frogs, *Hyla aurea*, one of the handsomest of all known species; others are Common Brown Tree-frogs, *H. ewingii*. The latter are the most confiding; but three of the green and golden frogs, domiciled in the fernery about a year ago, are so tame now that they rarely attempt to jump when touched or taken in the hand. Recent arrivals are wary. The early inhabitants have favourite spots, where they rest during the daytime—their hunting is done after dark. A hanging basket is the "habitat" of one Brown Tree-frog. It is seen there every day, with green fronds all about it. *H. aurea* is said to include small frogs in its dietary, but, so far, none of the examples in my shade-house has eaten a diminutive neighbour. Tree-frogs especially make interesting pets, and some of the Australian species are dainty and beautiful.—C. BARRETT.

THE PACIFIC GULL.

A bird familiar in Port Phillip Bay, the Pacific Gull, *Larus pacificus*, until recently was lacking from the collection of the American Museum of Natural History. A specimen has now been presented to the Museum by the New York Zoological Society, in whose gardens, for a time, it was exhibited alive. The acquisition is recorded in "Natural History" (Vol. XXV, No. 5, Sept.-Oct., 1925), the journal of the American Museum, and it is stated that the species is represented by only six or seven adult specimens in all the museums of the United States and Canada. Pacific Gulls, both immature birds in the dark, mottled-brown plumage, and adult examples, may often be observed from our Bay

beaches; but they are not confiding, like the Silver Gulls, *Larus nova-hollandiae*, which will come within a yard or two of picnickers, lured by scraps of food. There is but one species of the genus *Gabiamus*, and it ranges along the eastern and south-western coasts of Australia. I have found it nesting on islets and the larger islands of Bass Strait. On Cat Island it is an unwelcome neighbour of the Gannets, since it raids the great rookery there, taking both eggs and nestlings of *Sula serrator*.—C. BAURETT.

EXPORT OF AUSTRALIAN BIRDS.

Agriculturists overseas naturally are anxious to obtain Australian parrots and other birds for their aviaries, but it should be our aim to have export of all but the most abundant species completely prohibited. Even the common forms need some measure of protection, for they may decline, as the graceful and exquisitely-coloured grass-parakeets have done, until they approach the boundary of extinction. We cannot spare a specimen of any of our rarer parrots, even for Zoological Gardens in Europe or America, countries to which so many have been sent in the past. The enrichment of private and public collections overseas impoverishes us. Why should we lose our splendid birds, when it is possible to keep them in their native land?

In the new Check-list, compiled by a committee of the Royal Australasian Ornithologists' Union, and to be published shortly, there are unpleasant lines to read—they foretell the fate of several of our most interesting and beautiful species. The Paradise Parrot, *Psephotus pulcherrimus*, of Queensland, is "approaching extinction;" the Turquoise Parrot, *Neophema pulchella*, is "extremely rare;" and the Scarlet-chested Parrot *Neophema splendida*, "very rare." Formerly one of these doomed species, the Turquoise Parrot, was fairly common in certain Gippsland districts, including Berwick. It has not been observed in any part of Victoria for many years—at least I can find no record of it.

High prices for some Australian birds prevail in England. The following figures are quoted from a dealer's list, published in November, 1925:—King Parrots, £8 each; Rosellas, £2/10/- each; Pemmants (Crimson) Parrots, £3/10/- each. Galahs, £2/10/- each; Leadbeater (Major Mitchell) Cockatoos,

£6 each. An example of any of the rare species, such as the Turquoise Parrot, doubtless would realise in London, or New York, £25, or more.

C. BARRETT.

BELL-MINERS AND CUCKOO.

We have been interested in a pair of Bell-miners, *Manorhina melanophrys*, that reared a Fantail Cuckoo, *Cucumantis flabelliformis*. One day nine Bell-miners chased the fledgeling from a tree, and when it flew to another, the foster parents fed it. I was attracted, on December 11, by a great chattering in one of the chicken-yards and hastened to the rescue of what proved to be the young Cuckoo, now in adult plumage, and somewhat the worse of the treatment it had received at the bills of the numerous Bell-miners. The latter birds scarcely minded me, even attacking the Cuckoo while it was in my hands, flying from over my head, where they were perched, in a peppermint tree. The attack lasted for some minutes. I counted 40 Bell-miners, and there were as many more on the other side of the tree. Each time I called they desisted for a moment only; at last their attention was transferred to a Laughing Kookaburra, *Dacelo gigas*.—C. C. CURRIE.

PHOTOGRAPHS FOR "THE NATURALIST."

It is proposed, while funds permit, to include one plate at least in each issue of the *Naturalist*. Members are invited to submit prints for consideration by the Editor and the Publishing Committee. Unusual subjects are desired, not photographs of scenery, etc. Writers of papers might submit photographs suitable for illustrations.—Editor.

All contributions for the *Naturalist*, and letters to the Editor, should be addressed:

CHARLES BARRETT,

"Maralena," Maysbury Avenue,

Elsternwick, Vic.

The Victorian Naturalist

VOL. XLII No. 10.

FEBRUARY 5, 1926.

No. 506

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, January 18, 1926. The President, Mr. Geo. Coghill, occupied the chair, and about 50 members and friends were present.

REPORTS.

National Park, Wilson's Promontory.—The report given by the leader, Mr. C. Daley, appears elsewhere in this issue.

Spring Vale, Jan. 16.—After the leader had read a short paper on the economic importance of grasses, the party, ten in number, proceeded along the railway line towards the Springvale Cemetery, then across grazing paddocks to the Dandenong line. In the railway enclosure Kangaroo Grass and Wallaby Grass were very plentiful, but in the paddock scarcely a plant of these was seen, stock being very fond of them. About 10 native and 20 introduced grasses were found—P. F. MORRIS.

ELECTION OF MEMBER.

On a ballot being taken, Master Oliver Streeton, Fairlie House, South Yarra, was duly declared elected as an associate member.

GENERAL.

Mr. H. B. Williamson submitted proposals for obtaining permits for collecting ferns from reserved areas for herbarium purposes. Some discussion followed, in which Messrs. Hardy and Pitcher joined. The matter was left for future discussion.

Miss Nokes drew attention to the fact that the Mount Dandenong Progress Association was trying to obtain an area of about five acres on the top of Mount Everard for permanent reservation, and asked for the assistance of the Club. After some discussion had taken place, Miss Nokes

was asked to write to the Association for further information.

Mr. H. B. Williamson read a newspaper clipping advocating the reservation of Sperm Whale Head as a sanctuary for Eastern Gippsland. The chairman invited Mr. F. Barton, of Foster, to speak on the subject, and give further information in regard to the site, and as to what had already been done in the matter. This he kindly did, and, after some discussion, the matter was referred to the Committee, on the motion of Messrs. Hardy and Williamson.

PAPER.

"Flints and Their Origin," by Mr. F. Chapman, A.L.S. In the paper the author gave a brief and popular account of the formation and occurrence of flints in Europe and Australia, and the various uses to which they have been put. Several members joined in the discussion that followed.

The meeting closed with the usual short conversazione.

EXHIBITS.

By Miss Bolton: *Clematis microphylla*, grown at Canterbury.

By Mr. F. Chapman, A.L.S.: Flints in illustration of his paper. (1) Cone structure in flint, from Isle of Wight. (2) Fractured Miocene flints, Over Bird Rock, Torquay, Victoria. (3) Chert, with sponge remains, Upper Greensand, St. Lawrence, Isle of Wight. (4) Flint (Cretaceous), with molluscan remains, Watford, Herts, England. (5) Water-worn flints from Terrace Gravel. Foundations of the Victoria and Albert Museum, South Kensington, London. With enclosed Sea-urchin. (6) Sea-urchin (*Ananchytes*), from the Chalk. (7) Sea-urchin of the same genus in Flint, England. (8) An Upper Chalk Flint, with Polyzoa (*Heteropora*), Margate, Kent, England. (9) Tertiary (Miocene) Flint, Flinders, Victoria. (10) Rose-coloured Flint, from the Chalk of Swanage Bay, Studland Dorset, England.

By Mr. C. Daly, B.A., F.L.S.: Series of Flint Cores, with cutting points and Flint chips from Kitchen-middens along Victorian coast. Also a very robust specimen of the Trigger plant, *Stylidium graminifolium*, from Sealers' Cove.

By Mr. L. Hodgson. Herbarium specimens of *Helichrysum semi-papposum*, *Pimela ligustrina*, *Gynopogon buxifolius*, *Calocephalus Brownii*, *Hedycarya angustifolia* and

Veronica derwentii, from Lorne district. Collected January 1926.

By Mr. P. C. Morrison, M.Sc.: (1) Two specimens of the Crustacean *Thalassina Anomala*, a transition form between the crayfish (*Macrura*) and the crabs (*Brachyura*), and forming, with the hermit crabs and two rarer groups, the sub-order Anomura. Specimen i was taken alive on a mud-flat near Bowen, North Queensland, where numerous mounds about a foot high bear testimony to its powers of burrowing. Specimen ii was found as a fossil at Bathurst Island, near Port Darwin, and, in spite of the damage and distortion, it is seen to be specifically identical with specimen i. (2) A group of young specimens of the solitary coral *Fungia*, which grows from a stalk, breaking off and becoming free-living when adult. The old stem will give rise to a fresh animal, the marks of two previous individuals being visible on the largest stem. The other two stems are producing each their first individual. Specimen from Stone Island, Reef, North Queensland. (3) *Periophthalmus*, one of the bony fish, found commonly among the mangrove swamps in the tropics. The eyes are placed on top of the head, giving the animals their popular name of "stargazer." It is a common thing for these fish to emerge from the water and climb the roots of the mangroves by means of their arm-like pectoral fins. They will remain thus in the air for a considerable time, with only their tails in the water, and it is believed that respiration may be carried on partially through this organ. (4) Two small coral blocks from Hayman Island, Great Barrier Reef. *Favia speciosa* is perhaps the most beautiful and delicate of the corals, and is by no means uncommon, while *Calocerus Mayori* is among the rarer corals. (5) A series of camera studies of the Sooty Tern, *Sterna fuscata*, which comes in thousands every year to Michaelmas Reef, on the Outer Barrier, some distance north of Cairns, to breed. It was impossible to walk across the sand cay, without treading on eggs.

By Mr. F. Pitcher: The Erect Clematis, *C. glycinoides*, in flower; and frond of the Common Shield Fern, *Polystichum (Aspidium) aculeatum*, showing one method adopted for reproduction, in various stages of growth of young plants.

By Mr. H. B. Williamson, F.L.S.: Mounted specimens of 24 species of Ferns, the first instalment of a set of the Victorian Ferns to be donated by the exhibitor to the Club.

VICTORIAN FERNS

By H. B. WILLIAMSON, F.L.S.

PART II.

Family GLEICHENIACEÆ.

Genus GLEICHENIA.

There are four species recorded for Victoria, two of which are known as Coral ferns, and two as Fan ferns. They are all distinguished by the dichotomous branching of the fronds, the small number, 2-8, of spore cases in the sori, and the absence of an indusium.

GLEICHENIA CIRGINATA, Swartz. Coral Fern.—Wide-spread throughout Australia (ex. W.A.), New Zealand, New Caledonia and Malayan Archipelago. It is found scrambling among undergrowth in a tangled mass, sometimes to 12 feet, with frond pinnules at right angles to the branches, and divided to the midrib into numerous semi-circular segments, about one-eighth inch long. These segments are flat, or have their edges somewhat recurved, and the sori are near the upper inner angle, with three or four spore cases.

G. DICARPA, R.Br. Wiry Coral Fern.—Distribution the same as that of *G. circinata*, except that it is not found in S.A. It has the same habit and general appearance as the last named, but may be distinguished from it by the smaller segments of the pinnules, which are mostly under one-twelfth inch, and have their margins almost closed to the midrib, forming a kind of bag, scarcely any of the under surface of the segment being visible. Two or three spore cases almost fill this space.

G. FLABELLATA, R.Br. Fan Fern, Tas., N.S.W., Q., N.Z., New Caledonia.—The fronds of this fern are fan-shaped, with pinnules slightly toothed, not deeply divided, and not at right angles to the stem, but at about 45 degrees, rarely above an inch long, one-twelfth to one-eighth broad. The spore cases are in groups, mostly of four, along the lower half of the pinnule, away from the margin. Its distribution in Victoria is rather doubtful, for Mueller included with it

specimens which are now accepted as *G. laevigata* (syn. *flageoletii*). Few of the specimens in the National Herbarium are Victorian. Those from Tyers River, Mt. Pleasant Creek and the Grampians are apparently correctly named, and have been confirmed by the late Rev. W. W. Watts. Authentic records of its range are needed, and it is suggested to collectors that specimens thought to be *G. flabellata* should be sent to the Herbarium for verification and district record.

G. LAEVIGATA (Willd.) Hk. Spreading Fan Fern.—Distribution the same as that of *G. flabellata*. This fern differs from the last-named in having larger and broader pinnules, not toothed, and set at right angles to the branches, with their bases dilated. It is often of a glaucous hue, while *G. flabellata* is generally of a bright or a dark green. It is common in the Grampians and the Dandenong Ranges, and the writer has gathered it on roadside cuttings in the highlands of the North-East and also between Cann River and Genoa.

Family SCHIZACEAE.

Genus SCHIZEA.

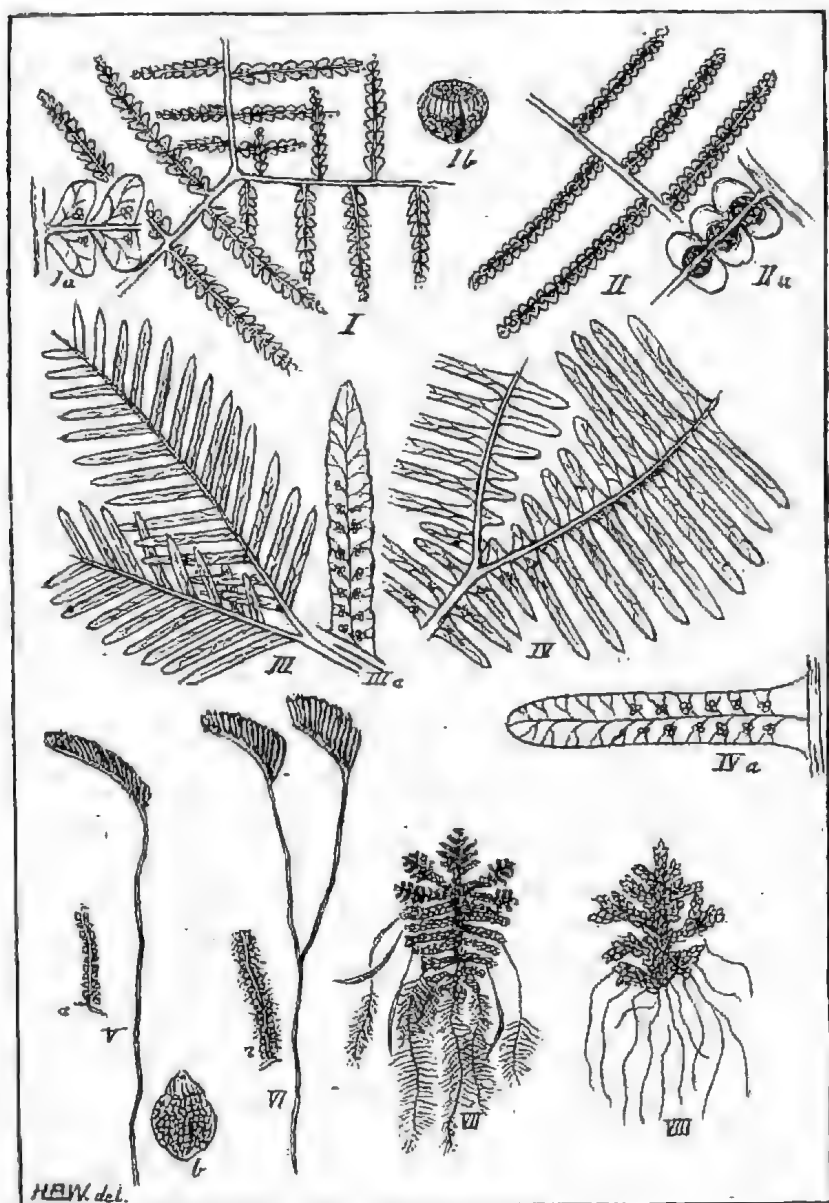
SCHIZATA FISTULOSA, Labill. Comb Fern, Tas., S.A., N.S.W., N.Z., As., Af., Polynesia.—This peculiar plant, often scarcely recognised as a fern, consists of a single thread-like stem, about 10 inches high, surmounted, when fertile, by a comb-like frond about an inch long, with as many as 20 pinnules, about one-eighth inch long, bearing sori, with from four to eight pairs of spore cases in each. The whole plant is of a reddish colour, and is easily overlooked. It has been gathered at Oakleigh, the Dandenong Ranges, the Grampians and South and East Gippsland.

S. BIFIDA, Willd. Forked Comb Fern. District the same as that of *S. fistulosa*, except that it is not found in S.A.—It is similar to *S. fistulosa*, and often grows in association with it. It can easily be distinguished by its forked stem. The comb-like fronds are shorter but the pinnules are about three-eighths-inch long and are narrower and fringed with long cilia.

Family SALVINIACEÆ.

Genus AZOLLA.

Included by Bentham under N.O. *Lycopodiaceæ*, but now counted among the ferns. Small floating plants, often covering the surface of lagoons with a red or green carpet. The fronds are branched and the segments are very small, and



Family GLEICHENIACEÆ (I—II—III—IV).

Family SCHIZÆACEÆ (V—VI).

Family SALVINIACEÆ (*Azolla*) (VII—VIII).

unequally, two-lobed. The spore cases are of two kinds, and are in the axils of the main branches.

AZOLLA PINNATA, R.Br. Ferny Azolla, S.A., N.S.W., Q., As., Af.—The floating fronds are regularly pinnate, sometimes twice pinnate, broadly ovate in outline, about an inch long, and provided with numerous rootlets, at first entire and dilated, but when older prettily feathered. It appears to be common in the Goulburn River flats, and may sometimes be seen on the Botanic Gardens Lake. The writer gathered it years ago on a pond in the Burnley Gardens.

A. FILICULOIDES, L., var. *RUBRA* (R.Br.), Diels, Red Azolla, S.A., Tas., N.S.W., Q., N.Z.—This is a much commoner species, and may often be seen thickly massed on the surface of ponds and lagoons. The brick-red appearance of water-holes is due often to this plant. The fronds are not regularly pinnate, but are simply branched, short, and with few rootlets, which are simple, not feathery.

EXPLANATION OF ILLUSTRATIONS.

Fig. I.—*Gleichenia circinata*. (a) Segment enlarged. (b) Spore case of *Gleichenia*.

Fig. II.—*G. dicarpa*. (a) Segment enlarged.

Fig. III.—*G. flabellata*. (a) Pinnule enlarged.

Fig. IV.—*G. lævigata*. (a) Pinnule enlarged.

Fig. V.—*Schizaea fistulosa*.

Fig. VI.—*S. bifida*. (b) Spore case of *Schizaea*.

Fig. VII.—*Azolla pinnata*.

Fig. VIII.—*A. filiculoides*, var. *rubra*.

THE LATE PROF. A. DENDY, D.Sc., F.R.S.—*The Journal of the Quekett Microscopical Club* (London) for November last contains an appreciative obituary notice of the late Professor Dendy, who passed away in London earlier in the year. Dr. Dendy was well known to many of the early members of the Field Naturalists' Club, which he joined in May, 1888, soon after his arrival in Melbourne as assistant to Prof. Baldwin Spencer, the then recently-appointed Professor of Biology at the Melbourne University. He soon took an active interest in the Club, and, after serving several years on the Committee, was elected one of the vice-presidents for 1893-4. In 1894 he was appointed Professor of Biology at Canterbury College, University of New Zealand. In 1903 he received the appointment of Professor of Zoology in the

University of Capetown, whence he returned to London, in 1905, to take up the professorship of Zoology at King's College, University of London, which position he held up to the time of his death. He was one of the visiting members of the British Association for the Advancement of Science to the Melbourne meeting in 1914, when he renewed his acquaintance with many old friends. He contributed several papers to the earlier volumes of the *Naturalist*, mainly on cryptozoic zoology—peripatus, planarian worms, etc. That he lost no time in starting his investigations is seen by the fact that in the number for January, 1889, he described two species of Peripatus which he had just found at Warburton. He was joint author, with Mr. A. H. S. Lucas, M.A., first Editor of the *Naturalist*, in the production of that well-known students' text-book, "An Introduction to the Study of Botany," which was designed more especially for Australian students. In later years he devoted considerable attention to sponges, on which he was a voluminous writer, and, at the time of his death, had become a world-wide authority on that group. He was for four years president of the Quekett Microscopical Club, and his death, at the age of 60, is a severe loss to zoological research work.—F.G.A.B.

FLINTS AND THEIR ORIGIN

BY F. CHAPMAN, A.L.S.

Many references may be found in literature to the hardness of flints, in illustration of the lack of charity or miserliness in certain characters. Thus we read of Antony's friend, Enobarbus, addressing Cleopatra:—

"Throw my heart
Against the flint and hardness of my fault;
Which, being dried with grief, will break to powder."

And we also remember that Dickens' Mr. Flintwinch was not a particularly mild-hearted personage, especially when his wife, Affery, had dreams.

Whilst admitting the hardness of flints, there are other minerals that are harder, but none so common; and this may account for the generally popular idea concerning them. For flints have a wide distribution both in Europe and Britain, and are usually found occurring in bands in the chalk of the South of England, as well as in Yorkshire, East Anglia and the North of Ireland. Flint has always been a favourite material, where found, for use in building, the stones often being disposed in patterns. A fine specimen of flint-work still in existence is in the Old Bridewell by St. Andrew's Church, Norwich, dating about A.D. 1400. According to Blomfield this is "esteemed the most curious wall of black flints in all England for its neat work and look, its stones being broken so smooth and joined so well."

Just as a petrified fruit may be encrusted by a layer of hardened rock, so have many of the terms we commonly use been wrapped in a new coat and have lost their original meaning. This name Flint, for example, is merely the Anglo-Saxon for a rock. And this calls to mind its allusion in the town of Flint, by the estuary of the Dee, in North Wales, where Flint Castle stands high upon the rock which was left as a "butte" when the surrounding country was washed away. The Scandinavian word "flinta" is a similar term. Hallaflinta, indeed, is applied by geologists to the intensely tough, cherty rock sometimes used as a touchstone for testing gold. The Greek plinthos, meaning a brick or shaped stone, also shows some kinship to the same word.

Our ancestors were well acquainted with flint in conjunction with the tinder-box, before the days of the lucifer and safety match; and the flint and steel was a common equipment until the early part of last century. In these days, when Japanese matches fail to do their duty, we may gain consolation by picturing a man of the middle ages who wanted to light his pipe by the tedious tinder-box, flint and steel.

This use of flint reminds us how some years ago, whilst walking over a ploughed field in Surrey, England, we picked up a squared piece of flint, thinking it to be an ancient palaeolith; but we were assured by a well-known ethnologist that it was probably a strike-a-light thrown away by an agricultural labourer.

In the old flint-lock gun, invented in the early part of the 17th Century, there is a flake of flint held in the cock, which

comes down upon the steel cap of the pan containing the priming. These flint flakes were, until recently, still being manufactured for exportation to Africa, and this "knapping" industry flourished until quite lately in the Norfolk village of Brandon. But far older still is the industry of making flint implements by the eolithic, palæolithic and neolithic men of Europe. Flint was preferred because of its good workable qualities, homogeneity and hardness, producing, by percussion, a more or less perfect conchoidal fracture. But that leads us into the wide field of ethnology.

And now as to the occurrence of these flints. When nearing the white cliffs of Dover, the "*Albion*" of the poets, one may notice the bands of black flints which there run almost horizontally at intervals of one to six feet apart. The intervening chalk is very like a modern deep-sea ooze, when seen under the microscope, since it is made up for the most part of the tiny shells of *Globigerina* and the remains of microscopic plants, with a sprinkling of siliceous diatoms and sponge-remains. As the flints themselves contain the same organisms as the surrounding ooze, they must have been formed in the place where they are now found, and the general consensus among geologists and physicists at present is, that the flinty matter in solution, in the form of a "water-glass," has spread along the sea-bed, and where it has been stopped from sinking by the presence of an impervious layer has formed strings of flint nodules.

In England, North America and elsewhere, except in Australia, flints are curiously enough confined to the White Chalk of Cretaceous age. In this land of anomalies, however, although we have rocks of the Chalk age, we do not there find the flints. They occur, strangely enough, in the Miocene Tertiary of South Australia and Victoria.

In a letter sent to "*Nature*," and published October 4, 1917 (in a symposial discussion on Flints started by Ray Lankester), the present writer offered some conclusions on the Australian aspect of the subject, from which it will be apposite to make the following extract:—

"These Cainozoic flints [of South Australia and Victoria] appear to be confined to the Miocene (Janjikian) beds, and are closely associated with the polyzoal limestone, a white, chalky deposit, consisting of polyzoa and foraminifera. The evidence of a microscopic examination of these flints goes to prove that the position held by Prof. G. A. J. Cole, that chalk flints represent a more or less complete replacement of

the chalky ooze, is the only one tenable from the Australian standpoint. The Australian flints are often crowded with the silicified remains of polyzoa, foraminifera, shell fragments and occasional sponge-spicules, the latter merely included as a component of the ooze, and not as selected material. During the formation of the flint the calcareous bodies are frequently dissolved, and only remnants are seen, in some cases, in the flint sections. Another point, in corroboration of Prof. Cole's contention¹ (based on Liesegang's experiments), is the presence of an impervious bed underlying these tertiary flint layers. This was pointed out long ago by Tension Woods, who stated that well-sinkers in South Australia have observed that a layer of flint is always found immediately above the water-level. The factor of an impermeable layer inducing deposition of diffused silica is an important one, and is strongly supported in those instances where I have had an opportunity of observing it."

From the fact that flints are almost pure chalcedony or cryptocrystalline silica, and without iron impurities, they are valuable for glass making; and the fine flint glass from which cut-glass is manufactured is produced from pulverised flints, carbonate of potash and oxide of lead. The silica of flints, being deposited in the first place as a jelly or colloid, it is not surprising to see it translucent in thin flakes, although in the mass it looks black. The white coating, moreover, which is nearly always found on flints, has really nothing to do with its being formed in a matrix of white, chalky limestone. This whiteness is entirely due to the fine atmospheric powdering, so to speak, of the skin of the flint, and is caused by the homogeneous flint having been broken up into numerous reflecting surfaces in the same way as when a piece of brown bottle glass becomes white when powdered. When flint nodules have been exposed to weathering, and perhaps to alkaline solutions for a very long time, this white coat may extend nearly, or quite, into the centre of the stone. In illustration of this there is the remarkable bed of flint pebbles in the Tertiary sands of the Bournemouth Cliffs, Hampshire; and when these pebbles are split with a blow they not infrequently show the white appearance right to the centre.

On the economic side, flints may be an indication of water supply. Whereas the nodular form of flints seems to be due

¹Cole, G. A. J., "The Rhythmic Deposition of Flint," *Geological Magazine*, 1917, pp. 164-168.

to the gathering of the silica around an organic mass or centre, the tabular flints probably owe their formation to the saturation of a layer immediately above an impervious marl band. In reference to the bands of flint occurring in the polyzal rock of Port Macdonell, Tenison Woods remarks:—"They occur in sheets of very great extent and about two or three inches thick, and are quarried and used as flags."

A similar band of flint, but in Victoria, was struck some years ago in the Mallee whilst boring for water. It was met with at 600 feet, and, owing to the resistance to tools, made the boring too expensive to carry through with the ordinary appliances. Probably, had this flinty layer been pierced, a permanent supply of water might have been tapped: for Tenison Woods has stated, in his "*Geological Observations in South Australia*," that the well-sinkers in South Australia observe that a layer of flints is always found immediately above the water level. This helps to confirm the writer's impression that, as also in the English chalk, an impermeable layer induces the deposition of an overlying band of diffused silica, resulting in the formation of flints.

It is obvious, in this question of the origin of flint, that much light has been thrown on the problem by the Australian data obtained. No well-directed effort of research can be in vain, and, even in the subject we have discussed, the economic aspect has been placed in a clearer light by showing how closely connected is detailed stratigraphical work with artesian water supply.

Like the early European inhabitants of the north, the Australian aborigine had an instinct for discovering flints from which to make his artefacts. At various places along the Otway Coast, and at Cape Liptrap, these flints appear to be washed out of the Tertiary limestones, and there, or in the vicinity, their flakes and worked tools can be found. But since the native was given to barter, these worked flints are generally widely distributed. At Altona Bay, for instance, the small flint knives, made from stone, found as far off as Cape Liptrap, beautifully notched and pointed, may be found in some numbers.

Alas for the romantic side of things! The aborigine takes the path of least resistance, for, as Sir Baldwin Spencer remarks, the black man, associating with the white, drops his time-hallowed custom of using flints and makes his tools of the bottle-glass ready to his hand.



THE LOMATIAS.

The Lomatias, with denticled, holly-like leaves, are close relations of the Waratah, and are among our frequently-met native shrubs. The long-leaved species prefers the river banks, and the other two are quite at home on the drier hill-sides, even the salty air of the seaside not interfering with them. Two of the genus are met with at an altitude of quite 4,000 feet.

Though handsome and worthy of garden culture, I do not notice them in the Honey Flora list. I am disposed to think, however, that before long they will find a place there, although, like some of the Eucalyptis, they do not flower equally well each year, and not as they are doing this season. A nine-feet-high *Lomatia Fraseri* growing in my garden is bearing its 100 racemes of flowers.

Busy insects gather round and extract the honey from the quaint, almond-scented, creamy flowers. One warm day I counted as many as 12 different kinds. Some I did not attempt to catch, others I secured for examination. These consisted of a red-headed hymenopterous insect whose abdominal extremity curved while resting; several representatives of the apis family, including a large, brown, hairy fellow with a large X on his back; another, a stubby bee with a greenish-brown head, hardly distinguishable from the rest of his body, a long-bodied, banded dipteran, with surprisingly quick-moving wings, which hovered long and often before deciding to drink. A dark-coloured, black-haired, bee-like insect also extracted its share of the nectar. Even a small common blowfly was seen in company with the common house fly and a small blue fly about the same size. These three last seemed to make things uncomfortable, in preventing from landing a dainty, very small, green-winged ant, whose large wings seemed out of proportion to its body..

These it kept extended both in flight and when at rest. No interference was shown, however, to a busy little black ant, who evidently knew well where the best results were to be obtained.

Mr. C. French, Jr., identified some of my visitors as *Tridomyrmex rufiniger*, *Calliphora villosa*, *Sepsis* sp., *Tephritis* sp., *Musca*, 2 sp., etc.

Last year I thought I had some mature seed saved from this plant, but, on picking the pods, found the contents, as usual, beautifully arranged, but with them an ochrey-yellow substance had formed that I took for a fungoid growth. Mr. D. B. Adam, however, considered it to be acicular crystals of some organic compound, with a brownish layer of disintegrated dead tissue cells. Thus, though externally the seed pods looked normal and ripe seeds might be looked for, some form of blight had killed all of them in their many cases.—A.J.T.

NATURAL HISTORY OBSERVATIONS BY NIGHT.

Wishing to see what was happening in the insect world during the hours of darkness, I took the opportunity recently, when on a visit to the mountains in the vicinity of Warburton, to make an investigation. Armed with a powerful acetylene bicycle lamp, I set off along a narrow timber tram line into the heart of the forest. The first things to attract my notice were hosts of small, brown caterpillars, with their heads all turned in the same direction, hurrying along the tram rails. For about 200 yards they could be seen everywhere, and were all making north. The only reason I could assign for this migration, if one could call it such, was the fact that extensive bush fires were raging some two miles to the south, and the scent of burning scrub was very strong. Several large Crane flies hovered into the beam of light, probably disturbed from their slumbers, as they are typical day-flying insects.

A large weevil of the genus *Poropterus* was found busily drilling a hole into a dead limb of a Beech tree. Many old logs were carefully examined, and upon most of them were seen many of the Tenebrionid beetles, *Apaxis howitti*. During the daytime these insects are always concealed under or inside rotten logs, but, during the dark hours, they become very active. Some examples of the somewhat rare Carab

beetle, *Melisodera principennis*, were found crawling on the trunks of stringy-barked Eucalypts.

Directing the rays upon the ground, several spiders were seen hurrying through the carpet of fallen leaves, and a fair-sized centipede noticed holding one of the previously-mentioned brown caterpillars in its mandibles. The next object of interest was a beautiful tree frog (*Hyla*), which was resting upon a small limb of a musk tree. The bright light apparently did not inconvenience him, as he appeared content to stay there as long as I wished to view him. Several specimens of the dark form of *Adrium artifex*, a small Longicorn beetle, were observed upon a freshly-fallen eucalypt, where they were no doubt seeking suitable situations for depositing their eggs.

The light next revealed a beautiful moth resting upon the trunk of a Sassafras tree. It was a species of the genus *Colussa*, and, with its brightly-shining eyes, quivering feathered antennæ, and wings resembling rich brown velvet, it was indeed a thing of beauty.

A rustling sound amongst the leaves of a Hazel tree drew my attention to a pretty little Ring-tailed Opossum, and he remained perfectly still, apparently dazzled by the bright light. Some small black ants were hurrying up a dead tree, each bearing a pupa, whilst at the foot of the tree there was a specimen of the brilliant-hued Carab beetle, *Notonomus opulentus*. The sound of running water suggested looking for aquatic insects, but the only things moving were some small, very active, shrimp-like crustaceans.

As my light was now beginning to give out, I had to relinquish my investigations, but I am looking forward to spending another interesting evening when an opportunity offers.—F. E. WILSON.

PARASITISM IN THE SANTALACEÆ.

Root parasitism has already been proved in the cases of many santalaceous plants; of Australian species notably in *Exocarpus cupressiformis*, by Dr. Benson, and in the Sandalwood and the Quondong, by Mr. D. A. Herbert. Suspicion was doubtless directed to these by the impossibility of transplanting them successfully, or of cultivating them from seed.

In the *Journal of the Royal Society of Western Australia* for 1924-25 Mr. Herbert convicts seven other members of the

family of the same degrading habit. These are *Fusanus spicatus*, R.Br., *F. acuminatus*, R.Br., *Leptomeria preissiana*, D.C., *L. spinosa*, D.C., *Choretum lateriflorum*, R.Br., *Eucarpus aphylla*, R.Br., and *E. sparteae*, R.Br. All were found to develop numerous lateral haustoria, which penetrated the roots of the host plants more or less deeply, but not attacking the wood. All also seemed to be auto-parasitic. The haustoria varied greatly in size. In *Leptomeria preissiana* they attained a diameter of one-third of an inch, in *Eucarpus aphylla* a quarter of an inch. In *E. cypressiformis*, a much larger plant, they had been found so small as to be discernible only with the aid of a lens. Only in *E. sparteae* were they developed apart from the presence of alien roots.

Leptomeria spinosa alone showed discrimination in the choice of a host, the others not being at all particular in this respect. While some species like *Eucarpus aphylla* grow in such close proximity to another plant, or even appearing to grow out of it, as to at once suggest parasitism, others like *Fusanus acuminatus*, by its isolated position, seemed to disarm suspicion until the length of its roots, sometimes extending for a distance of twenty yards, showed its ability, in spite of distance, to reach those of its victims. As in others of their kind, root hairs were almost or entirely wanting.—C.S.S

PHOTOGRAPHS FOR "THE NATURALIST."

It is proposed, while funds permit, to include one plate at least in each issue of the *Naturalist*. Members are invited to submit prints for consideration by the Editor and the Publishing Committee. Unusual subjects are desired, not photographs of scenery, etc. Writers of papers might submit photographs suitable for illustrations.—Editor.

All contributions for the *Naturalist*, and letters to the Editor, should be addressed:

CHARLES BARRETT,

"Maralena," Maysbury Avenue,

Elsternwick, Vic.

The Victorian Naturalist

VOL. XLII—No. 11

MARCH 5, 1926

No. 507

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, February 8, 1926. The President, Mr. Geo. Coghill, occupied the chair, and about 50 members and friends were present.

REPORT.

Mornington, January 30.—The leader, Rev. G. Cox, forwarded a report of this excursion, which showed that though very few members availed themselves of this opportunity of visiting Mornington, an interesting programme was carried out successfully.

ELECTION OF MEMBER.

On a ballot being taken, Master Fred. Barton was duly declared elected as an associate member of the Club.

GENERAL.

Bush Fires.—The Hon. Secretary, Mr. C. Oke, referred to the widespread bush fires. He had been, on the previous day, at Warburton, where large areas along the railway line, particularly between Mt. Evelyn and Wandin, and between Millgrove and Warburton, had been swept by fire. The whole of Mount Little Joe, as seen from the line, appeared to have been burnt out. He thought that an article might be published in the *Naturalist*, indicating the extent of the areas devastated by the fires. In future years it would form a reference, and would also enable some idea to be formed as to the time required by a fire-swept area to regain its normal state.

Mount Everard Reservation.—Miss Nokes stated that bush fires had been burning on the mountain, and probably had swept the area it was proposed to reserve. If such was the case, the local Progress Association would, most likely, let the project lapse.

LECTURE.

"Along the Queensland Coast—A Biological Tour," by Mr. P. C. Morrison, M.Sc. This lecture was illustrated by a large number of excellent lantern slides, showing various forms of animal and vegetable life, also some very interesting views along the Queensland coast. Several members spoke in appreciation of the lecture and the lantern views.

The meeting closed with the usual short conversazione.

EXHIBITS.

By Rev. G. Cox: Fossil leaves of *Lumnitz*, *Nephelites* and *Mollinedia*, from Balcambe Bay; also lignite from the same locality.

By Mr. J. R. Leslie: Bifurcation in frond of *Lomaria*.

By Mr. P. C. Morrison, M.Sc.: Plates from the carapace of the large Queensland turtle; corals from the Great Barrier Reef; and aboriginal weapons from Queensland.

By The National Herbarium, on behalf of the Rev. A. C. F. Gates, M.A., of Iara, who has been botanising on Mt. Erien and surrounding region:—*Baekea Gunniana*, Schauer, Mountain Heath Myrtle; *Baekea*, probably new to science; *Callistemon Sieberi*, D.C., Alpine Bottle-brush; *Senecio vagus*, F.v.M., Saw Groundsel; *Senecio pectinatus*, D.C., Alpine Groundsel; *Helichrysum rosmarinifolius*, Less. Rosemary Everlasting; *Olearia floribunda*, Bth., Heath Daisy-bush; *Helichrysum lepidophyllum*, Tovey and Morris, Clubmoss Daisy-bush; *Celmisia longifolia*, Silver Daisy; *Gentiana (saxosa) montana*, Forst., Mountain Gentian; *Proserpyllum Tudgelthunum* and *P. Suttonii*, Rogers and Rees.

EXCURSION TO MORNINGTON

The programme of the Holiday Week-end Excursion began with the departure from Mornington on Saturday, January 30, at 9 a.m., of 11 members of the local Naturalists' Club, three visitors and the leader. At Moorooduc the arrival of the train from Melbourne was awaited, but no F.N.C. members came by it. After lunch the party walked to the large quarry, where a wonderful face of rock of Ordovician age is exposed. By means of specially-prepared cards, and the external evidences in the quarry itself, the leader explained the relative age and formation of the rock mass.

Mt. Eliza, at the back of the quarry, was ascended, and from the summit a fine panoramic view was commanded. A walk along the ridge, through the bush, brought us to a granite outcrop, which has been partly opened up. The stone appears to be of very fine quality, and greatly resembles the well-known Harcourt granite [clear white felspar and black (biolite) mica]. A ramble in another direction led to the banks of a reservoir (nearly dry), from which numbers of valves of the fresh-water mollusc (*Pisidium* sp.) were collected. A bush track led back to the quarry. On the way to the station several interesting botanical specimens were gathered, including a fine spray of *Dianella laevis*, with purple seed-berries. A halt was made at a wayside pool, on the surface of which floated water-lilies, in full bloom. Among the water-weeds skirting the pool a rich harvest might have been gathered for pond-life study.

The train by which we returned to Mornington brought two lady members of the Club. After tea, reinforced by 12 young men, visitors, the party attended, by invitation, at the leader's home. A collection of aboriginal weapons and implements (about 160 pieces) was examined, the leader giving a descriptive talk; then the local Club's collections were viewed.

Sunday was spent according to the individual tastes of members. On Monday the first party, consisting of 18 local members and two visiting members, assembled, at 9.30 a.m., and walked to Fossil Beach. Here a camp was established, and the party dispersed over the Balcombian fossil beds. Meanwhile, the leader returned to the station to meet the Melbourne train, by which arrived three lady members, who were driven out to join the advance party. After lunch the party set off for the Balcombe's Bay leaf beds (Miocene), passing *en route* the brown coal deposits, and turning aside to visit a gully in which flourishes the *Plume Humea* (*H. elegans*), now only in bud. The spot on which Captain Matthew Flinders landed, in April, 1802, was seen. The way led over several rocky outcrops, among which (as the tide was very low), a number of chitons was taken. Most of the specimens seen at the leaf-beds were fragmentary, though some good specimens have been obtained there on local Club excursions.

Some members of the M.N.C. had erected their tents on the beach, and a few of the younger ones enjoyed a swim. After returning and resting at the "dump," another visit was

made to the marine shell beds. No great finds can be chronicled, though a good assortment of the species characteristic of the beds was found. Among the living types of interest taken were a fine large hermit crab, and the boring mollusc (*Barnes obturamentum*), in burrows in the clay. The day was ideal for collecting, the tide being so low, and the water perfectly still. The children joining the local Club have proved themselves experts at collecting, one girl, 11 years of age, having recently collected nearly 100 chitons during an afternoon, many of them hardly visible to the naked eye, and none of them over three-quarters of an inch in length. A number of botanical specimens claimed notice during the day, but no new or unusual types were recorded.—REV. G. CONN.

EXCURSION TO WILSON'S PROMONTORY

The sixth Club excursion to Wilson's Promontory took place during the New Year holidays. On January 2 eight members travelled in a covered waggon from Fish Creek. Passing through the western extremity of the Hoddle Range, over an area bearing everywhere evidences of the ruthless destruction of the once dense forests and luxuriant fern gullies, the low-lying heath or moorland was crossed, to Fisherman's Camp, thence down the beach to the Darby River.

At the Inlet Sahara-like stretches of sand intervene when the tide is out. This coast is interesting in showing phases of the denudation of land and encroachment of sea, varied by successful resistance and approach by sand-dunes against the action of wind and tide. In the former case the planing down of what appear to be either old swamp-beds, with peaty bottoms, or extensive carbonaceous deposits, derived from sea-weed, and the inroads made on the clumps of Banksias, many trees of which are washed right out on the verge of the sea, are evidences; in the other, the heaping up of the sand in the shallows around the slightest obstruction, the growth of grass-fufus, then tussocks, and, further back, coastal scrub as sand-stays, consolidating and extending as dunes the line of defence and advance, are equally striking.

During the week we rambled in the neighborhood of the chalet and the Darby River, Tongue Point, and the Darby spur and saddle, as far as the southern limit of Norman Bay, and along the telegraph track to Bad Saddle, with

deviations therefrom to Lilly-pilly Gully and Sealers' Cove respectively; the latter a two-days' journey. Since last year a hut has been built at Sealers' Cove, and another at Tidal River, for the convenience of campers. The tracks are in good order; that to Lilly-pilly will ultimately be extended to the head of the Gully, where a waterfall about 15 feet in height adds to the beauty of this sylvan retreat. In a home paddock two or three kangaroos or wallabies and an emu are kept for observation by tourists who are unable to make long excursions. The season for wild-flowers was almost ended, but 76 species were noted in bloom, some only scantily. *Bursaria spinosa*, *Cassinia aculeata*, *Lotus australis*, *Thomasia petalocalyx*, *Senecio laevis*, *Scoropola sarcolepis*, *Lobelia purpurascens*, *L. anceps*, *Olearia axillaris*, *Viminaria denudata*, with the *Banksias*, *Hakens* and *Xanthorrhoeas*, were more profuse in flowering. Among the orchids, *Dipodium punctatum*, *Gastrodia sesamoides* and *Thelymitra longifolia* were in flower. Most of the leguminous plants were in fruit, as were *Ricinus pinnifolius*, *Leucopogon Richei*, *Eoacarpus stricta*, etc.

There is a noticeable tendency to communal growth in the National Park, e.g., the dense grove of *Casuarinas* on the Darby spur, the fine *Banksia* groves beyond the densely-clustering *Melaleucas* and *Leptospermums* of the river flat, the imposing array of grass-trees on various areas, the profusion of Lilly-pillies in the gully appropriately bearing the name, the extensive thicket of hazels marking the approach and some part of the slope in the descent to Sealers' Cove, and then the distinctive fern-gully vegetation of that moist and sheltered area. This characteristic may be noted also in the species of *Eucalypts*, and in the grouping of morass and swamp vegetation.

The trip to Sealers' Cove was completed before a heavy rain-storm. It was noted that the growth of Myrtle Beech is very much more extensive than was thought to be the case, many young plants growing in the rich soil. At the Cove an easterly wind, with a heavy sea, beat into the bay, while the rain-storm had for precursor the gathering of thick cloud-wracks on the mountains enclosing the Cove. Several birds, including two Little Penguins, *Endyptula minor*, were found dead on the beach. Fortunately the rain kept off until our return.

During our stay at the Park three or four kangaroos and about 10 wallabies were seen, the Black-backed Wallaby,

Macropus vultabatus, being the more plentiful. In some instances the animals showed little fear of observers. Of course, a single individual has the better chance of seeing animals, which a large party will disturb. About half a dozen Koalas were observed, chiefly on the blue gums. One at Sealers' Cove, was perched at a great height. Evidences of the presence of wombats were noticeable. It was interesting to hear from two independent witnesses of an animal having been seen at Lilly-pilly which answered to the description of the Bush-tailed Rat or Thum. Mr. Hanks, on a visit to the Light-house, saw through the glass about 20 seals disporting on a rocky island to the westward. A few small snakes were seen, two of which—copperheads—were despatched. A visitor reported having seen an antlered deer towards the Vereker range. There are deer on Snake Island, but I am not aware that deer have been introduced to the Promontory. The lizard, *Egernia whiti*, was numerous, and sustained the reputation previously earned for friendliness. One was almost reduced to a torpid state by eating to repletion of March-flies, supplied by Mr. V. Miller; while another pretty, copper-coloured lizard fearlessly caught flies on the writer's hand and coat-sleeve. Galaxias, or mountain-trout, are numerous in the creeks. At Lilly-pilly Creek they ate greedily the scraps thrown into the stream, and allowed Mr. Miller to stroke their sides gently with a switch. The largest seen was just over six inches in length.

Birds were very numerous and tuneful, especially in the sheltered hill and river scrub near the chalet. At daybreak one can hear the full, rich notes of the Harmonious Thrush, the matutinal song of the Mogpie, the passionate call of the Coach-whip Bird, the harsher cries of Honey-eaters, the cheerful twitter of *Acanthizas* and Scrub-wrens, the dour note of the Bronzewing, and the challenging song of the Butcher-bird. Blue Wrens are at home at the chalet. The Swallow still rears broods under the back verandah, and a Kookaburra takes stock of visitors from a neighbouring post. We heard the mournful cadence of the Pallid Cuckoo, and also the Bronze Cuckoo's note. Over the river an occasional Cormorant flew, a White-fronted Heron lazily changed his location, or a few Ducks followed the windings of the stream. A Eyre-bird was seen near Sealers' Cove, and their imitative calls were also heard. Special observation was made of the birds, more than 50 species being noted by the party, and listed carefully by Miss McMahon and Mr. Hughes. Among these were the Black

Cockatoos, which, with Wattle-birds, affect the Banksias. A colony of Emu-wrens was located by Mr. Hanks near Whisky Creek, and among the Parrakeets' Crimson Parrots were numerous. Straperas were seen in timbered country. Among sea-birds, the two species of Oyster-catcher, White-bellied Sea-eagles, Pelicans, Pacific gulls and Australian Curlews were observed.

The Emus introduced to the Park favour the more open, grassy country. They have prospered, and are a source of attraction to visitors. It is a pity to find that, during the last year, clutches of young have been almost destroyed by foxes, one of which was seen at Sealers' Cove. As with dingoes in the past, the increase of foxes is favoured by the character of the country. In regard to introduced birds, three of the party recognised the Blackbird's song, but the bird was not seen. The Goldfinch is travelling southward, it was seen at Fish Creek.

Insect life seemed numerous, varied and vicious. Sand-flies and March-flies overpowered tourists with unwelcome attentions, whilst *Culex irritans* was unusually alert.

In a previous report mention was made of the wreckage cast up along the Western coast, against which the prevailing drift current strikes in its eastward course. On the shores of the bay lies a considerable quantity of timber, pine and blackwood, with scores of bent rims, in sets, for buggies and other vehicles. This is from the wreck of a vessel carrying timber, which foundered, less than a year ago, near Cape Liptrap. Many good, but empty, barrels are cast up on the shore.

We returned to the city on January 11. I would suggest a well-organised excursion by boat on some future occasion to the Eastern coast of the Promontory, with Sealers' Cove as a base for operations.—CHARLES DADY.

Mr. Charles French, sent., one of the founders of the Field Naturalists' Club of Victoria, and former Government Entomologist, will contribute several articles to the *Naturalist*. They will deal chiefly with the early days of natural history in Victoria, and, besides relating his own experiences as an entomologist and botanist in the field, Mr. French will give memory pictures of other pioneer naturalists. The articles will be illustrated with portraits.

ALONG THE QUEENSLAND COAST

A BIOLOGICAL TOUR

(Notes on a lantern lecture delivered before the Field Naturalists' Club of Victoria, February 8, 1926)

By P. CROSBIE MORRISON, M.Sc.

Travellers of the Seven Seas two centuries ago returned home with tales of fairy islands where every prospect pleased; where one had only to enjoy oneself; where choice fruits—satisfying food—dangled temptingly from every tree; and fuzzy-haired beauties were waiting to dance attendance upon the fortunate traveller. And whenever the hearers, becoming enraptured, seemed to forget the fortitude of the narrator, he had but to dwell for a moment upon the awful dangers of the coral, to make them turn pale with fear, and murmur a prayer of thankfulness that their paths led away from tropical waters, and that they still held to foggy England.

Coral was the dread spectre in the life of the mariner. Many a proud admiral ground out her life against the treacherous horns of some hidden reef, and stout was the heart of him who would seek out new lands among the Coral Seas.

In 1770 Captain James Cook had the experience of imminent shipwreck on the Endeavour Reef, close to the town which now bears his name; and only by beaching his ship for repairs in the Endeavour River was he able to pursue his homeward course. Thirty years later Captain Matthew Flinders sailed right along the Great Barrier Reef, and chartered fairly nearlately the 1600 miles of its western fringe. After that date the Reef was touched upon intentionally only by a few naval survey vessels, such as the "Thetis" and the "Rattlesnake," and unintentionally by a few of the early immigrant ships, such as the "Wansfell," whose perilous trip in 1861, when she arrived from England three months overdue, carrying a full complement of immigrants all on the verge of starvation, has been immortalised by numerous entries on the Admiralty chart of the Coral Sea.

As time went on, it became increasingly evident that the charts of this region—mainly those of Flinders, which have remained almost untouched for more than a century—con-

tained a number of inaceuracies. The action of the Admiralty in sending out specially-equipped survey ships to undertake charting work on the Reef for an indefinite period, so aroused public interest in the less fearsome and more interesting aspects of this unique geographical possession of ours, that the Great Barrier Reef Committee was formed, with headquarters in Brisbane, to undertake and direct the scientific investigation from various standpoints—mainly geological and biological. It was in the latter capacity that the writer was sent to Brisbane in 1925, and thence to the various points of interest along the coast. The work done was mainly microscopic, and, since the macroscopic material obtained contains nothing new to science, only a few notes on the more interesting features of the general work are given here.

Travelling overland from Victoria to the North, little difference is noted in the general aspect of the country. The same types of Eucalypts seem to follow one from Wilson's Promontory to Cape York, with small breaks of tropical jungle of palm, and fig, and lawyer-cane in the moist parts, such as the coastal region from Cardwell to Cooktown, and upon the Atherton Tableland. Xanthorrhoeas of slightly differing species spread before one all the way up, and the aspect of the drier plain country is thus fairly uniform, in spite of the change into tropical latitudes.

One surprise for the traveller is the pine-clad slopes of the continental islands of the Whitsunday and Hinchinbrook Groups, hundreds of miles north of the Tropic of Capricorn. In the distance these Araucarias resemble the Northern pines, and one is faced with a sub-arctic scene with a shade temperature of over the 100 mark. Typical plants set their mark on different areas, and on lightly-timbered country one sees numbers of the palm-like "screw pine," "bread fruit," or *Pandanus*, a lonely relic of the group Pandanaceæ, which flourished in a bygone age. Then the strand flora includes such plants as the spiny-seeded *Tribulus*, the goats-foot *Convolvulus*, *Ipomea pes-capri*, the Candle-nut tree, the Coral Taburnum, *Tournefortia*, *Scavola*, *Hibiscus*, and *Morinda*, all of which form a dense background of shrubbery through which tower the graceful stems of the coconut palms, *Cocos nucifera*. The coconut, by the way, is not a native, but is planted on practically all the islands along the coast for the benefit of men who may be cast away with no other means of sustenance.

The mud flora is always very typical, too, consisting of the three main Mangrove genera, *Avicennia*, *Rhizophora* and *Bruguiera*, occurring in belts from sea to shore in that order. Associated with these curiously-specialised trees we find a number of smaller salt-resisting plants, of which the most common is the holly-leaved *Acanthia ilicifolia*. Stretches of bare mud in a Mangrove swamp can always be depended upon to yield, besides the sandflies and mosquitoes, a whelk-like *Telescopium* and a Grapsoid crab, *Metopograpsus messor*; and usually the whole of the dead wood is riddled with the boring mollusc, *Teredo*.

The coral reefs are a disappointment if one sees them uncovered by an exceptionally low tide, for then all the polyps close, and the gorgeous colours largely disappear. But dive into the lagoon when the reef is covered, and the gaudiness is amazing. Clashing colours on every side make the scene appear as if taken from some extravaganza, and the specious beauty is a thing never likely to be forgotten. Although the main part of the reef will be of all one type of coral, such as the massive *Porites*, or the stag-horn *Acropora* and *Pocillopora*, the holes are a shelter for the numerous more delicate forms, and grouped together one may see small knobs of *Favia*, *Calocleris*, and *Meandrina*, in the shallower parts; and, a little further down, the delicate stag-horn, *Seriatopora*, the carnation coral, *Euphyllia*, and such others as *Galaxea*, *Hydnopora*, *Pavona* and *Fungia*.

On these reefs, too, one finds Beeche-de-mer, *Tridacna*, the giant clam, with the largely undeserved reputation for drowning people; *Diadema*, a sea-urchin with needle-like spines a foot in length and charged with a painful poison; *Lana*, a bivalve, which swims actively by flapping the valves of the shell together; brilliant polychaete worms with crowns of gaudy tentacles; and the giant sea-anemone, *Discosoma*, which attains a diameter of 15 inches, and shelters many smaller animals as commensals within its coelenteron.

The crabs in the reef region include three gregarious types, which are of interest. The first, *Myctûris longicarpus*, has a close relative to be found in large numbers round about Black Rock, Port Phillip Bay, where an army of some hundreds dig into the sand when disturbed, marking their resting places with typical rosettes. The armies in the North are similar, but many thousands strong, and their progress can be heard from a considerable distance

sonnding like the loud rustle of leaves in a wind. Then there is *Scopinera inflata*, the Sand-bubbler Crab, which feeds on the organic particles adherent on the sand grains left by a receding tide. All the used sand is rolled up by the chela into little spherical pellets, which are cast away in radiating lines round the burrow for a radius of about ten inches. *Uca marionis*, the Calling Crab, also is a burrowing form; the male has the right chela enormously developed, so that it hides the whole of the body as seen from the front, and coloured a brilliant orange. A crowd of these crabs on the beach resembles a patch of orange beans, and a chance movement on the part of the observer acts like the wave of a magic wand. A thousand brilliant claws are brandished in the air in a beckoning fashion, a thousand chela give as many loud "cracks," and lo, the flat is bare of colour, as, with incredible swiftness, the crabs tumble down their burrows.

The thousands of Sooty Terns, *Sterna fuscata*, seen breeding on Oyster Cay have already been described under "exhibits" in a previous "Naturalist." The turtle-hunting was much the same as that enjoyed by all visitors to the Reef; and the Green Ants are always there. These "paper-bag" ants live in bag-like nests, made by fastening together a number of leaves. Never have I seen more aggressive insects; a touch of the nest is sufficient to call out the guard, all straining to reach the intruder. Once I had the misfortune to run my head into a nest in the undergrowth, and had to disrobe completely in order to rid myself of the vindictive little creatures. Their grip is so tenacious that one may pull them asunder before they will release the skin grasped between their mandibles. Cause have I to remember the Ngerrikudi name for this insect—"auau." Obviously some aboriginal etymologist, in early times, had had my experience, and was verbally inspired.

The Editor again appeals to members to contribute nature notes suitable for the Field and Study Section of the *Naturalist*. These pages, he has been assured, are popular, but more variety would be welcome. Paragraphs recording personal observations are most desired.

VICTORIAN FERNS

By H. B. WILLIAMSON, F.L.S.

PART III.

Family MARSILIACEÆ.

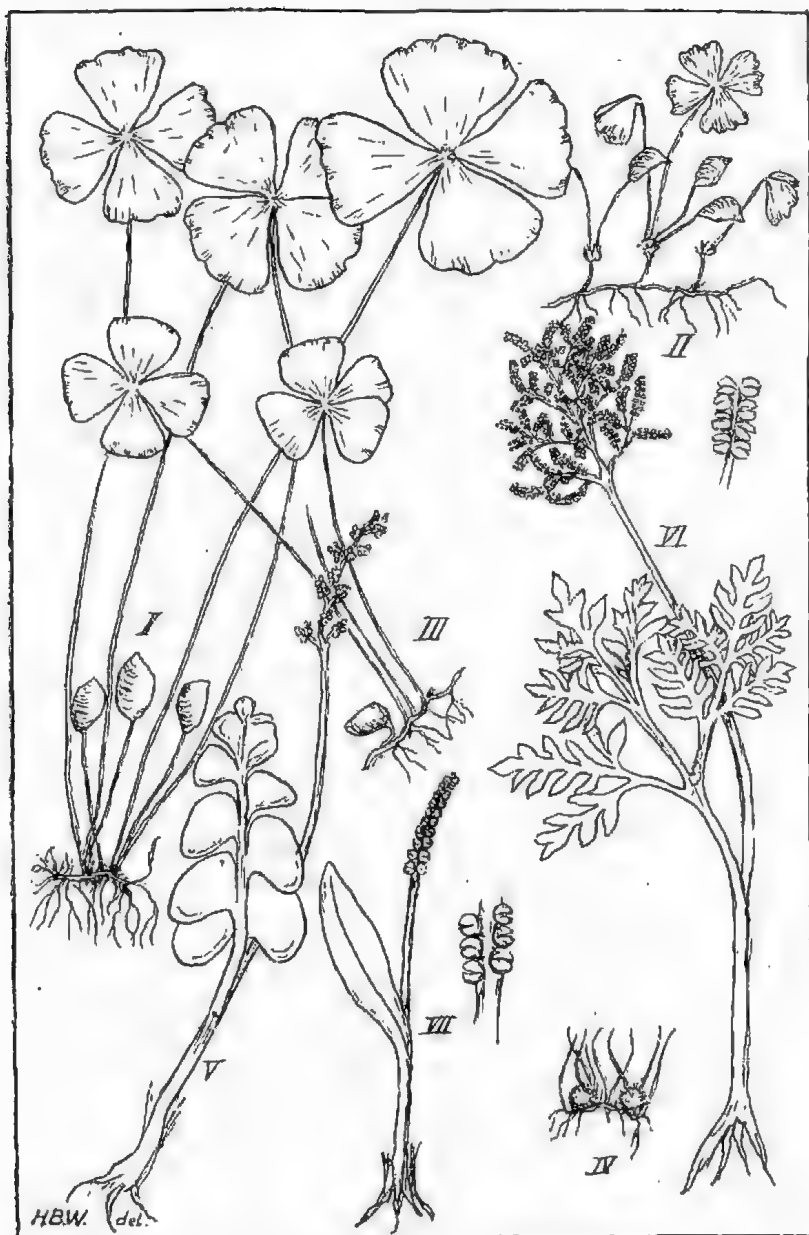
In this family fronds spring, as in many ferns, from a rhizome, and are rolled inward at the top (circinate) when young; and, like some ferns, *Marsilia* produces sterile and fertile fronds, the latter being developed from the lamina of the frond, which is recurved and closed to form a utricle or involucre (often called a sporocarp), enclosing the spore cases which are of two kinds, and are attached as sori to the underside (inside) of the utricle.

Genus *MARSILIA*.

The name of the genus is from the latinised form (*Marsilius*) of the name of an Italian naturalist Marsigli.

To various species the name "Nardoo" has been applied, and sporocarps have been used among the blacks as food. Burke and Wills tried to sustain their lives by the aid of Nardoo. A. Braun in 1870 indicated as many as 14 distinct species, many of which were included by Mueller under the name *M. quadrifolia*, L. Bentham and other botanists have failed to appreciate Braun's distinctions, and it is probable that only half-a-dozen Australian species at most can be sustained. The Victorian forms seem to lie within the limits of the descriptions of the two following species.

MARSILIA DRUMMONDII, A. Braun. Nardoo (Fig. I). This grows in temporarily inundated depressions; sometimes in water six or eight inches deep, with its pretty reddish-green sterile fronds floating on the surface. These fronds consist each of four segments, reminding one of clover leaves. In drier clay flats the fronds are much shorter, and the segments sometimes only a quarter of the size indicated, and often very hairy and lobed or crenated (Fig. II). When one looks at the extreme forms they can scarcely be accepted as the same species, but when one tries to separate the complete chain of intermediates one can realise the difficulty



I-IV MARSILIACEÆ

V-VII OPHIOGLOSSACEÆ

which caused Mueller to lump them as forms of *M. quadrifolia*, L., the distribution of which is given in the Australian Census, 1889, as all States of Australia, and As., Af. and Europe.

M. HIRSUTA, R.Br. (Fig. III). Short-fruit Nardoo. This is a form with the sporocarps sessile or nearly so, otherwise scarcely to be distinguished from the preceding species. The regional distribution requires investigation, as it was formerly placed as a form of *M. quadrifolia*. We have specimens from the North-west and from Geelong district.

Genus *PILULARIA*.

This genus differs from *Marsilia* in having the sterile fronds filiform instead of being expanded into flat leaflets.

PILULARIA NOVE-HOLLANDIÆ, A. Braun, Pillwort. W.A., S.A., Tas., N.S.W., E., As., Af., N.Z. (Fig. IV). This plant, owing to its small size, is rarely gathered. Its rhizome creeps under water, and it has thread-like sterile fronds about half an inch long. Its fertile fronds are the pill-like sporocarps about one-tenth of an inch in diameter on short stalks. It may be looked for on the muddy beds of drying water-holes in the N.W., S.W., and S. of our State.

Family OPHIOGLOSSACEÆ.

The plants of this family have not their young fronds circinate as in other families of ferns, and their spore-cases are comparatively large, and are set in two rows on the simple or branched fertile fronds.

Genus *OPHTOGLOSSUM*.

OPHTOGLOSSUM CORIACEUM, A. Cunn. Adder's tongue. (Fig. VII). Very widespread through the world.

This curious little fern does not favour fern gullies, but may be found in damp clay paddocks in early spring in all districts of the State. The author has gathered it on the alluvial flats of the Murray at Mildura in patches of clay showing little grass or other vegetation. A barren lanceolate frond an inch or two long and half-an-inch broad, of rather thick texture, and a linear fertile frond bearing two rows of spore cases, spring from the single stem. The latter has a fancied resemblance to a snake's tongue.

Genus *BOTRYCHUM*.

This genus differs from the last-named by having its fronds much divided into segments, and is named from the Greek *botrys*, a cluster of grapes, referring to the arrangement of the spore cases.

BOTRYCHUM LUNARIA (L.) Sw. Moonwort. Tas., N.S.W., E., As., Af. (Fig. V). This, the "Moonwort" of the old world, is rare in Victoria, having apparently been gathered only by Mueller, Cobungra (Bright to Omeo). "Snowy Plains, on the Ovens, Goulburn, Caboga and Mitta Mitta Rivers." Spore cases are produced on a branched frond 3 to 5 inches long, and its barren frond has semi-circular segments (moon shape) pinnately arranged.

B. AUSTRALIS, R.Br. Meadow Moonwort. Tas., V., N.S.W., Q., As., Am., N.Z. (Fig. VI). This fern has been recorded from all districts of the State except the north-west, though it has been frequently overlooked. Mr. F. G. A. Barnard has in cultivation a specimen, gathered at Oakleigh, in July, 1892; it has been exhibited at several meetings of the Club. Mr. F. Pitcher reported the species from Linn East, in 1925, and Dr. Heber Green found it at Mooroolbark recently. It is common on the western side of the Snowy River mouth.

Its barren fronds are feralike, divided into three primary pinnae, which are again pinnate with segments denticulate. The veins are almost concealed in the thick texture of the fronds. The fertile fronds are much branched, the branches bearing large spore cases sessile in two rows.

In the course of excavation at a brickyard in the village of Predmont, some 100 miles north-east of Vienna, a remarkable discovery was made. At a depth of 14 feet, in a bed of Loess, formed of the debris from glaciation of a lime-stone out-crop nearby, Professor D. K. Absolon, of Prague University, curator of the museum at Brunn, found a tomb containing 20 human skeletons. One wall of the tomb is composed entirely of the shoulder-bones of mammoth elephants, showing that these prehistoric people were "mighty hunters." Professor Arthur Keith, in an article in the London "Daily News," of October 31, 1925, describes this ancient hunting station as the most remarkable and extensive known. From the skull measurements, Professor Keith states, the men belonged to the Auragnacian period, which dates back at least 15,000 years. The tomb was covered by a heavy layer of stones 16 inches thick, evidently to protect the remains from hyenas and wolves. How did man, in those remote days, with his rude stone weapons, manage to contend with, and kill the mammoth elephants in such numbers as this tomb betokens?—A.E.K.

THREE VICTORIAN SPECIES OF OPHICARDELUS (CLASS MOLLUSCA)

By TOM IREDALE.*

Twenty years ago Mr. J. H. Gatliff published in this journal a "Catalogue of Victorian Estuarine Univalve Mollusca" (Vol. XXII, pp. 13-16, 1905), and I cannot find that much has been added thereto since. Twelve species were listed, and under the genus name, *Ophicardelus*, one species, *O. australis*. Quoy and Gaimard, only appears. As localities at that time known—Back Beach, Williamstown, Port Philip, and Hastings, Western Port—only are cited, probably many others are now known.

At Lakes Entrance, Victoria, Roy Bell collected three clearly distinguishable species, and these were easily identified at the British Museum as *O. stutchburgi*, *O. quoyi* and *O. ornatus*. Hedley, in his Check List of New South Wales Marine Mollusca, included the Estuarine forms, and there two species were ranged under *Phytia ornata* and *sulcata*.

At Church Point, Broken Bay, New South Wales, I collected three species, determined as *ornata*, *sulcata* and *quoyi*. Comparison showed that the specimens referred to as *sulcata* agreed with those determined as *stutchburgi*, and consequently these names are synonymous. As the latter was described from Port Curtis, Queensland, it extends along the east coast from there to Lakes Entrance.

Hedley was of the opinion that *quoyi* had been erroneously recorded from Port Jackson, and that it occurred in New Zealand. While it is common here, the New Zealand shell varies, and has a name already, *costellaris*. Again Morsson's two species, which Hedley suggested were synonymous with *ornatus*, I determine as *quoyi*.

In order to clarify this matter, I present figures of the three species, with their names and distribution:—

OPHICARDELUS ORNATUS (Férussac). (Fig. 1.)

Auricula ornata, Férussac. Tabl. Syst. Anim. Moll., p. 103, 1821: Hab. (?)

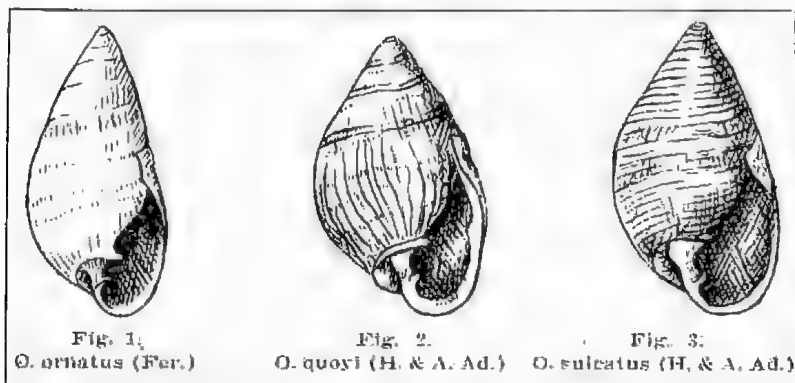
*By permission of the Trustees of the Australian Museum

Auricula ovata, Gray. Spicilegia Zoologica, pt. 1, p. 5, pl. 6, fig. 21, 1828; "South Sea Island, Stutchbury." Probably Sydney, N.S.W. (Not *A. ovata*, Lam., 1806.)

Auricula australis, Quoy and Gaimard. Voy. Astrol. Zool., Vol. II, p. 169, pl. 13, figs. 34-38, 1832; "Western Port, Vic., and V.D.L."

Auricula bidens, Potiez et Michaud. Galerie Mollusques Douai, Vol. I, p. 201, pl. xx, fig. 9-10, 1838; "Nonvelle Hollande."

Cremnobates cornua, Swainson. Papers Proc. Roy. Soc., V.D.L., Vol. III, pt. 1, p. 43, pl. vii, fig. 1, Jan., 1855; near Hobart Town, V.D.L.



Ophicardelus australis, Tate and May. Proc. Linn. Soc., N.S.W., 1901, p. 419; Tas.

Ophicardelus australis, Gatliff. Vic. Nat., Vol. XXII, p. 16, May 4, 1905; Vic.

Ophicardelus ornatus, Hedley. Proc. Linn. Soc., N.S.W., Vol. XXXVIII, p. 334, 1913.

Phytia ornata, Hedley. Check List Marine Fauna, N.S.W., Moll. M. 95, 1918; N.S.W. May, Check List Moll., Tasm., p. 88, 1921; Tasm. Illustr. Index Tasm. Shells, pl. 40, fig. 24, 1923; Tas.

Easily recognised by its shape and lack of sculpture; an incised line showing below the suture on the earlier whorls only; slight depression behind the inner lip; outer lip sharp, not thickened nor toothed.

Specimens examined from New South Wales, Victoria and Tasmania.

OPHICARDELUS QUOYI, H. and A. Adams. (Fig. 2.)

Ophicardelus quoyi, H. and A. Adams. Proc. Zool. Soc. (Lond.), 1854, p. 34; Jan. 10, 1855; Moreton Bay, Queensland.

Melampus tetricus, Morelet. Journ. de Conch., Vol. XII, p. 290, July 1, 1864; "Nouvelle Calédonie de Sud."

Ophicardelus irregularis, Mousson, Journ. de Conch., Vol. XVII, p. 64, pl. v, fig. 2, Jan. 1, 1869; "lac Tom-Tom, près Wollongong."—Tom Thumb Lagoon, near Wollongong, New South Wales.

Ophicardelus minor, Mousson, Journ. de Conch., Vol. XVII, p. 65, pl. v, fig. 3; same locality.

Ophicardelus quoyi, Hedley, Proc. Linn. Soc., N.S.W., Vol. XXXVIII, p. 333, pl. xix, fig. 87, 1913; N.S.W.

A shorter, broader shell, showing irregular growth ridges on last whorl, an incised line below the suture present on all the whorls; no perforation, but a depression behind the reflected inner lip; the outer lip thickened, and with an indistinct tooth medially internally.

Specimens examined from New South Wales and Victoria.

OPHICARDELUS SULCATUS, H. and A. Adams. (Fig. 3.)

Ophicardelus (Laimodonta) sulcata, H. and A. Adams. Proc. Zool. Soc. (Lond.), 1854, p. 34, Jan. 10, 1855. Hab.: (?) Probably Sydney, N.S.W.

Melampus (Ophicardelus) stutchburyi, Pfeiffer. Proc. Zool. Soc. (Lond.), 1856, p. 393, May 8, 1857; Port Curtis, Queensland.

Ophicardelus sulcatus, Hedley. Proc. Linn. Soc., N.S.W., Vol. XXXVIII, p. 333, pl. ix, fig. 86, 1913.

Ophicardelus stutchburyi, Hedley. Proc. Linn. Soc., N.S.W., Vol. XXXVIII, p. 334, pl. xix, fig. 88, 1913.

Phytia sulcata, Hedley. Check List Marine Fauna, N.S.W., Moll. M. 95, 1918; N.S.W.

Strongly sculptured with revolving liræ; less marked on the body whorl; a small perforation persistent behind the reflected inner lip.

Specimens examined from Queensland (Port Curtis), New South Wales and Victoria.

AQUATIC INSECTS

It is surprising that more members of the Club do not devote themselves to the study of aquatic insects. The terrestrial forms claim many collectors (though not many real workers), probably because they force themselves under our notice by their brilliancy, or, maybe, their quaintness. But very few members think of exploring our lakes, ponds and streams for the wonderful forms that live in water. The study of aquatic entomology has, in fact, been almost entirely neglected by members, and the young entomologist who will devote himself to this branch of natural history is sure of a rich reward.

The dragonflies have received some attention in our State, but more in New South Wales, as Dr. R. J. Tillyard's splendid monograph on the Odonata shows. Dr. Tillyard has also studied the caddisflies, but the other Orders of insects have received very little attention. Occasionally one sees a few water-beetles in a collection of insects, but generally they are species that fly great distances at night, and are attracted by street lamps—and so find their way into the coleopterist's cabinet. There are many species of water beetles that are never seen out of their native element. Some of these are of great interest, others extremely rare; and they await the enthusiast who, armed with a collecting net and drag-hook, with which to bring up weeds from the bottom of deep pools, sets out to make himself famous, perhaps by the discovery of unique specimens.

I admit it is less easy to rear aquatic larvæ than it is terrestrial forms, but if the larvæ are taken when nearly fully grown the task is not so difficult, and many interesting facts may be recorded. The life-cycle of some aquatic beetles, from egg to imago, sometimes takes several years to accomplish—a long time to wait: but what valuable information concerning a species one would gain, if its life-cycle were worked out! A much quicker way is to place the beetles in an aquarium—covered to prevent their escape by flight—and watch carefully until the female has deposited her eggs.

Some beetles attach their eggs by an adhesive to the under-side of leaves of water-plants; others make incisions in the cuticle of the stems, where they deposit their eggs. One large

Hydrophilus makes a water-tight cocoon, in which she lays her eggs. This is attached to the under side of a leaf, and has a ventilating shaft, or funnel, projecting above the water. Another species, a small, black beetle, resembling the terrestrial "sun beetle" in appearance, carries her eggs about with her in a light web attaching to the point of the abdomen.

When the young larvæ appear their shape should be noted and figured, as they sometimes alter after ecdysis, or moulting. When you are assured of the general appearance of the larva, nearly adult forms may be taken in ponds, and if these are placed in the aquarium you may succeed in obtaining the pupa, and later the imago, and so observe all the changes that take place during the life history.

The smaller beetles are found, generally, on water-weeds, and these must be carefully examined. Often the aid of a pocket lens is needed to detect the beetles, as they cling to the weed. Small curculios are often thus found. Other kinds hide under debris and stones, or bury themselves in the mud at the bottom of the pool, coming to the surface at intervals to breathe. The tip of the abdomen is held just above the surface-skin of the water, the elytra raised the merest fraction to allow the exchange of exhausted air for a fresh supply; and the insect dives to the bottom again. Some of these small beetles—*Pelotinus* among others—make a chirping noise while thus engaged. This "chirp" is made by rasping the tibia over the edge of the elytra. A similar sound is produced by *Corixa*—one of the water-bugs—and in the same manner.

The collector will soon become familiar with the haunts and habits of water-beetles, and with the knowledge thus gained will soon have a well-filled cabinet of specimens, and note-books filled with details of life histories.

Aquatic Hemiptera also are worthy of study; the early larval forms of *Notonecta* and *Corixa* make beautiful objects for microscopical study, especially under dark ground illumination. Their eggs also are interesting. Small Hymenopterous insects that use their wings under water as if they were flying—and they progress fairly rapidly—are occasionally found. Nothing is known of their life history, nor of their anatomy. One species has a remarkable organ on the wings, which I believe to be respiratory in character. I have shown this, under the microscope, at Club meetings.

There must be large numbers of midges and other flies still undescribed; their aquatic larvæ are very beautiful,

and have remarkable structures. I was fortunate enough, on a Club excursion to Nyora, to be able to record as *new for Australasia* one genus, *Maclonix*. Other members of the group, *Corethro*, *Chironomus*, *Ceratopogon*, *Tanyptus*, and many others, are to be found—sometimes in great numbers—in their larval stages in our ponds, and only await description.—J. SEARLE.

THE HOME AQUARIUM

Aquaria have long been popular with a small number of nature lovers, mostly residents of Adelaide and Sydney. In both these cities Aquaria Clubs exist, and the interest in the hobby is steadily increasing. Should Melbourne lag behind her sister capitals? When in Sydney recently I went to Farmer's to view the famous "Fish Alley." It has become an institution, a delight to both adults and children: while several hundreds of tanks, I believe, have been purchased by citizens.

Mr. H. E. Finckh, the veteran aquarist, kindly showed me his wonderful private collection of fishes, amphibians and aquatic plants, that thrive in many glass-tanks and garden ponds at his home, Raglan Street, Mosman. He has a long record of success, and his enthusiasm for aquaria has never waned. The frogs and newts, and many of the lovely little fishes that he cherishes, are tame almost as the pet parrots and pigeons and kookaburras of the yard and garden. It was surprising to see two of the quaint Jumping-fishes, *Periophthalmus*, climb, with their fins, on to a flake of rock in the tank, and take food from their owner's fingers. (Often in North Queensland have I vainly tried to capture specimens of these elusive little fishes among mangrove roots.)

We have, in Australia, some freshwater fishes, suitable for the home aquarium, and desirable foreign species are obtainable, some at small cost; though others are expensive. If one commences on the right lines, and continues to follow them, an aquarium, I was assured, will be a continual source of instruction and pleasure. It is wrong to keep fishes in a bowl—they require a properly-constructed tank, or a pond, stocked with plants that have proved to be the best for aquaria. The plants themselves are beautiful and interesting, and Mr. Finckh has cultivated some remarkable species that are too little known in Australia.—C. BARNETT.



THE MANDALOTUS WEEVILS.

Among the largest genera of the family Curculionide, which comprises all those beetles known as weevils, is *Mandalotus*. All the species are small, and all are of dingy appearance, but they are notable for wonderful variety in structure.

Mandalotus occurs in all parts of Australia and Tasmania, and on many of the adjacent islands, but possibly nowhere are these beetles more plentiful than in Victoria. The majority of species are covered with a scale-like substance more or less interspersed with short setæ, but there are a few that are quite smooth and shining. One particularly fine species has its hind legs covered with a very long pale pubescence. For some years I have paid much attention to this interesting genus, and have a fine collection of specimens. Although so many species had been previously described, nearly all I secured proved to be new to science.

Mandalotus may be sought for with most success in moss and grass-tussocks, but leaf debris also often provides a rich harvest. In fact, according to Mr. A. M. Lea, who has recently completed a revision of the genus, the finest species of all was one I obtained by sieving leaf debris from beneath a tree-fern growing in the ranges above Millgrove. It is remarkable on account of the curious armature of its hind tibiae. Two species, *crudus*, Erich, and *ventralis*, Blackb., occur rather frequently among the roots of Marram grass on the sea beaches at Lorne. Another rather plentiful species is *armivarius*, Lea, which may be obtained from moss at Fern-tree Gully. Our Editor, at my request, brought some grass-tussocks from the summit of Mount Feather-top, from which I secured several examples of *decipiens*, Lea, a smooth, black, shining species. This beetle evidently is a

lover of high places, as the only previous records of habitat are Mounts Baldy and Hotham. One species, *Crawfordi*, named by Canon Blackburn, is credited with doing considerable damage to growing cereal crops in the Mannum district of South Australia. As far as I am aware this is the only black mark recorded against any member of the genus.

One of the largest species is *posticulis*, Lea, which I have taken occasionally in moss at Belgrave. It is a dumpy beetle with a somewhat mottled clothing, and, like most of its brethren, very lethargic in its movements. In fact, this latter characteristic leads to many specimens of *Mandalotus* being frequently overlooked, even by experienced collectors.

—F. E. WILSON.

AUSTRALIAN REPTILES AND AMPHIBIANS.

A Check List of the snakes of Australia is being prepared for publication by Mr. J. R. Kinghorn, C.M.Z.S., of the Australian Museum, Sydney, who, during the past few years, has done much to increase knowledge of our reptilian fauna. About 170 species of Australian snakes have been described, and it is probable that more will be discovered, but not many, since the Order, as represented in this country, is fairly well known. The latest novelty is a sea snake from Northern Australia, and Mr. Kinghorn's description of it will be published shortly in the Proceedings of the Zoological Society, London. Its appearance is almost repulsive; thorny scales project from above the eyes.

During a recent visit to the Australian Museum I gleaned some facts concerning that institution's fine collection of reptiles and amphibians. Each of from 9,000 to 10,000 registrations is carefully noted on a catalogue card. The specimens on the shelves are in lettered divisions; each shelf in turn bearing an index letter, and each tier of shelves being lettered. The cards are arranged systematically, and an index of generic names tells one where to look, e.g., the Black Snake, *Pseudechis*. Both cards and specimens will be found in division B, J, A. B equals batch of shelves; J, the shelf; A, first division. Such an arrangement means that any specimen presented, from the earliest days of the Museum until to-day, providing it has not been destroyed or sent away, can be found in a few seconds.

There are some 30,000 bottles, each containing an average of, say, six specimens, in the "Spirit House"; that is, reptiles,

fishes, crustaceæ and other groups, and each group is arranged and catalogued in the same manner; a work which took nearly 12 years to complete. The reptile collection contains many valuable and unique forms, as well as many which are yet to be examined, with the possibility of new species or varieties.

At the present time Mr. Kinghorn is working on a monograph of the reptiles and amphibians of the Solomon Islands.
—C. BARRETT.

A FAMILIAR FROG.

Widely distributed over the southern portion of Australia, the Brown Froglet, *Crinia signifera*, is one of the most familiar amphibians around Melbourne. I have found scores of specimens under stones and logs, and always in damp places. Lucas and Le Soutef describe this Cystignathid frog as an "active little creature" ("Animals of Australia," p. 275), but it is easily captured, and often has indolent moods. I met with it in January last at an altitude of 5000 feet on Barrington Tops (Mount Royal Range), N.S.W. One example was found hiding under a log on dry ground, nearly a mile from water. In a gully of the lowlands, where a creek flows in good season, but parched now, another Brown Froglet was discovered among stones and withered ferns. It was tiding over a dry spell, not too happily, being in poor condition and inactive.—C.B.

Mr. Hugh Watson, of Cambridge, England, who has been studying the anatomy of several species of land molluscs from Victoria, makes the following comments in a recent letter:—"The radula of *Succinea australis*, Fér, is of a fairly usual type; but the jaw is very characteristic with a dorsal plate such as is found only in the *Succineidae*, and in those strange slugs—the *Athoracopharidae*. Like most carnivorous snails, *Rhytida ruga*, Cox, has no jaw; but the long narrow radula, with very large pointed teeth, is perhaps even a little more highly specialised than that of *Paryphantu atramentaria*.—Mr. Watson has kindly sent me a mounted radula of each of the species mentioned. That of *R. ruga* is a beautiful object for the microscope.—C. BARRETT.

Corrigenda.—Naturalist, Jan. 8, 1926, p. 214, line 11 from bottom: For "englyphoides," read "englyphoides." Feb. 5, 1926, p. 238, line 18 from bottom: For "Chal," read "Chert."

The Victorian Naturalist

VOL. XLII—No. 12

APRIL 9, 1926

No. 508

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria Street, on Monday evening, March 8, 1926. The President, Mr. Geo. Coghill, occupied the chair, and about 50 members and friends were present.

CORRESPONDENCE.

From Hon Sec., A.A.A.S., giving information regarding the next meeting of the Association, to be held in Perth, commencing on August 23, 1926, and inviting this Club to appoint representatives to the General Council. On the motion of Messrs. F. G. A. Barnard and F. Pitcher, Messrs. Coghill, C. Daley and J. A. Kershaw were appointed.

REPORTS.

Reports of excursions were given as follows:—Botanic Gardens, Mr. C. Oke; Black Rock, Miss J. Raff, M.Sc.; Frankston, Mr. A. L. Scott.

Mr. Harvey moved that a vote of thanks be accorded to the Committee for having entertained members at the Botanic Gardens. Seconded by Mr. Pitcher, and carried.

GENERAL.

The President drew attention to some very fine plates depicting the Forest Flora of South Australia, which Miss Hart had presented to the Club, and moved that a vote of thanks be accorded her. Seconded by Mr. E. E. Pescott, and carried.

PAPERS.

1. "Additional Microzoa from the Red Limestone of Grangeburn, near Hamilton, Vic.," by Mr. W. J. Parr.

In the absence of the author, this paper was read by Mr. Chapman, who gave a brief description of the country around the fossil deposit near Hamilton, and referred to the more interesting parts of the paper.

2. "Two Entomologists in the Mallee," by Mr. C. Oke.

The author gave some account of a holiday spent in the Mallee, and referred to many interesting insects which he had found there, notably species found living in the nests of ants.

Messrs. Coghill and H. B. Williamson and Dr. C. S. Sutton took part in a discussion following the reading of this paper.

NATURAL HISTORY NOTE.

Mr. Daley read a note on a very common garden spider, which he had found sitting on its egg capsules in his garden. He wondered whether the spider was helping to incubate the eggs. Mr. Oke said that the species was known as the Birds'-dropping Spider, *Selena excavata*, and was not assisting the incubation of its eggs, but was, like Mr. Micawber, waiting for "something to turn up."

EXHIBITS.

Mr. F. G. A. Barnard: *Botrychium alstrale*, Meadow Moonwort. Collected at Oakleigh, about 1888. First exhibited at a meeting of the Club in July, 1892. Now showing new frond, four weeks old.

Mr. J. A. Kershaw: *Ceramodactylus damucus*, Luc. and Frost, from Red Cliffs. A lizard new to Victoria, previously recorded from Central Australia.

Mr. C. Oke: Case of Coleoptera from North-western Victoria.

Mr. E. E. Pescott, F.L.S.: Aboriginal basalt axe, recently collected in the Western District, Vic., made from limestone "flint," showing two grooves for hafting; three "knives" or scrapers, from the same locality, showing secondary edge-chipping.

Mr. A. L. Scott: Hand specimen of pink granite from Mt. Buffalo, Vic. Also micro slide of Mt. Buffalo granite.

NOTE.—Under a low power, using polarized light, it is revealed that the apparently simple rock, granite, is really a very complex structure. Using a higher power, it is seen that, when the quartz, the last to solidify, became solid, it entangled in itself, in the form of innumerable small bubbles, the gases that had not been able to escape, or to enter into chemical combination to form minerals. The degradation of the felspar into kaolin is also shown. In the hand specimen the felspar is identified by its regular outline and its pink colour. The quartz, owing to its transparency, is best seen near the edge.

CORRIGENDA.—In Report of Excursion to Mornington, "Naturalist," March, 1924, p. 255, "Plume Humen (H. elegans)" should read: "Show Cassinia (C. spectabilis)."

TWO ENTOMOLOGISTS IN THE MALLEE.

By C. OKE.

(Read before the Field Naturalists' Club of Victoria,
March 8, 1926.)

My friend, Mr. J. E. Dixon, had often told me about the thick Mallee scrub along the railway line between Gypsum Siding and Bronzewing, which he had noted as very promising beetle-country, while returning from his numerous visits to Lake Hattah. So, when he asked me to visit Gypsum for a week or two I was very pleased to accompany him.

Leaving Melbourne by the 5.16 p.m. Mildura train on October 31, 1924, we arrived at Gypsum (274 miles) about 5 o'clock next morning. There is no station at Gypsum, merely a siding for the loading of gypsum, or kopi, which occurs freely in the neighbourhood. On the rare occasions when a lady passenger wishes to alight from the train, a short ladder is produced, but a man has to drop off as best he can.

It was still too dark for us to see our way about, so we sat on our packs and waited—not long—for daylight. What a paradise was revealed at dawn. All around was a dense growth of Mallee and shrubs, including the scrubby Mallee Pine, *Hakea*, *Grevillea* (3 spp.), *Acacia*, *Cassia*, and, in parts, patches of *Calytrix tetragona*, which was blooming to perfection. Bushes with dark-pink and pure white flowers were growing side by side, and, in places, intertwined so that it seemed impossible that any constituent of the soil had helped to produce the colour of the blossoms. Though, where growing on the white sandy ridges, most of the plants had white flowers, an occasional plant having deep pink flowers was met with even there.

We strolled along the railway line, then followed a foot-track into the scrub. We soon came across some *Leptospermum* in flower, and commenced to look for beetles. The first species to be taken was *Stigmatera eldii*, and soon afterwards *S. elongatula* and *S. vittata* were found. A strong smell was traced to its source—a long-dead fox—which was turned over with a stick. Underneath were two species of Carrion-schafers, *Trox australasiae* and *T. velutinus*, and a pair of that weeping lover of bad smells, *Platylabus lachrymosa*. His "tears" are more evident than those of the crocodile, being little, black, raised spots on the reddish wings, which bear a somewhat fanciful resemblance to tears. I had

thought to get some Staphs. on this carrion, but failed to find a sign of them.

Not far from the fox I noticed some ants running across the track, and, as they looked familiar, I picked up one, and at once recognised it by its sweet odour as *Iridomyrmex nitidus*. By following the ants the nest was soon discovered in some sticks and a stump. Lacking a tomahawk, I had to be content with a look around the sticks. However, I was fortunate in finding a nice little Staphyllinid, *Dabia nitida*, Lea. This insect, although it closely resembles the other species of *Dabia*, can hardly remain in that genus, as characterised by Olliff, as none of its antennal joints are transverse. As it was impossible to break open the sticks, the direction of the nest was marked on the track with the intention of working it another time. Unfortunately, this was not done, so its treasures remained ungathered.

As accommodation is not procurable at Gypsum, we had brought a tent. A camp site opposite the 274-mile post was selected. This we thought to be the best spot, as it was near the "station," and right in the scrub and collecting ground, but we had to walk a mile for a billy of water. Still, to camp at the "tank" meant to be on cleared paddocks. The drawback in being so far from water was the lateness of morning and evening meals, the midday "snack" being eaten in the scrub, without a drink. Of course, a couple of miles' straight walking is not far, but we persistently took "short cuts" through the Mallee. Here the temptations to delay were innumerable, and the going was very slow. As a matter of fact, some of the best beetles of the trip were taken while we were "running the billy." Perhaps the finest species taken at Gypsum was *Carenidium superbum*, Cast. This is a large black Carab, an inch and a quarter in length, with a decided waist, and having beautiful purple reflections on the upper surface, and greenish around the margins. I caught this beetle while returning with the morning supply of water, and, in the excitement of the chase, upset the billy, and had to return to refill it—about three-quarters of a mile. We had a late breakfast that morning! Another fine Carab, found on the way to the tank, was *Carenum imitator*, Sl. This insect is about an inch in length, black, with pronotum and elytra green. Yet another species, found under a Mallee-root, was a pretty colour variety of *Carenum anthracinum*, MacL. This specimen was black, the elytra with violet and bronze reflections, and a narrow green margin.

On the second evening, while going for water, I turned over a piece of wood, and, seeing that it covered a nest of

Iridomyrmex rufoniger, an ant that is the "host" of many "guests," I searched carefully all around the nest. Very soon I found a small guest. Later I had the pleasure of seeing a second specimen in one of the little tunnels of the nest; it had apparently been hiding under some rubbish in the nest, and was now making its way underground. These beetles proved to be the greatest treasures of the trip. They belong to the family Pselaphidae, but are very distinct from any species known to me in nature or description. I have named the species *Malleecola myrmecophila* (M.S.)—the ant-loving dweller of the Mallee. It is about $2\frac{1}{2}$ mm in length, and of a pale castaneous colour. The head has a number of carinae, or raised ridges, which divide it into distinct areolets. There is a wedge-shaped projection through the hind margin of the eye, the latter being unusually prominent. The antennae are eleven-jointed, but the ninth joint, though wide, is so thin, and closely applied to the tenth, that it might easily be overlooked. The prothorax has three longitudinal carinae and peculiar wing-like flanges on the sides. The legs are also very unusual for a Pselaphid, being flattened sideways and angular, somewhat as in the Histerid genus, *Chlamydopsis*.

While I was getting these new beetles Mr. Dixon found another nest of *Iridomyrmex* under an old bag, and in this several specimens of *Paussoptinus laticornis*, Lea, were found. This species has, I believe, only been recorded as an inquiline of *Iridomyrmex nitidus*, an ant with which I have not found it associated; but we found it here (and also at Bendigo) with two other species of that genus, viz., *I. rufoniger* and *I. gracilis*. Mr. A. M. Lea considers this to be the finest species of Ptinidae in Australia, and I agree with him. It is a beautiful little beetle, especially when alive, and running around, waving its wide, but flattened, antennae from side to side, or up and down. It would be tiresome to give the details of each day's work. I say work, for, believe me, we worked. This was no loafing holiday, but a continued hunt for beetles.

The camp was situated on a dull-red, sandy flat, through which shallow trenches had been dug in all directions, in the search for "Kopi," which is whitish, and occurs in "pockets" all over the flat. Gypsum crystals occur in small patches, but not very freely. In all directions sand ridges are seen, some large, others small. A series of ridges, about half a mile on the Brownzewing side, seemed to us to be particularly inviting, and here we spent many delightful hours.

The vegetation around the camp consisted of two species of Mallee, hundreds of very small Murray Pines, with an occasional large one, "Turpentine bush," *Hakea*, *Grevillea*,

Acacia, and that abomination of the Mallee country—Porcupine Grass. This last is a continual source of annoyance when one is collecting, and makes the wearing of leggings almost a necessity. Several times, when chasing flying insects, I came in violent contact with clumps of *Triodia*, some of the points piercing my legs. These points snap off—pieces about one-eighth of an inch in length—and cause irritation of the skin; when fresh, they are rather difficult to remove. The best plan is to leave them for a few hours, when the flesh about them begins to fester. They are then easily pressed out between finger and thumb, and the sores heal as quickly as they developed.

There was a fair amount of animal life on the flat, though it consisted mostly of small insect forms, ants (in particular) and spiders predominating. The exceptions in size were *Emus*. Several were seen, sometimes together, sometimes solitary. Twice I saw a bird, probably the same one, with chicks. A pair of Butcher-birds, *Cracticus torquatus*, had their nest within a dozen paces of the "station" camp. The young birds were able to fly fairly well, but were just learning the art of whistling, and very amusing they were in their attempts to imitate their parents, breaking off in the middle of a call, and looking around in a startled way, as though afraid of their own temerity. Two or three of them were often to be seen in a large Pine tree, having choral practice, and apparently chiding one another on their vocal powers. Two species of Wren-warbler, not found in the Melbourne district, were to be seen flitting among the scrub, but more often around the *Calytrix tetragona*; they were the Black-backed, *Malurus melanonotus*, and the Purple-backed, *M. assimilis*. The former, a beautiful study in blue and black, was as confiding as its congener, *M. cyanus*, which is so plentiful in some places near Melbourne. The Purple-backed Wren-warbler, which is so easily distinguished by the reddish patch on the body around the wings, appears to be very shy, and takes flight on the slightest movement near it.

Spiders, as I have already said, were numerous, and trap-doors were plentiful all over the flat. But nearly all of them were owned by Wolf-spiders—Lycosidæ. In fact, I succeeded in finding only one belonging to one of the true Trap-door Spiders—Aviculariæ—and this was quite small. There are two species of Lycosidæ inhabiting trap-door nests here. One is of a dingy grey-brown colour, the other appears (the appearance is entirely due to the hairs with which it is clothed) to be a pretty silvery-grey, with distinct black stripes. The latter is the more common of the two. It is

amusing to walk quietly around, keeping a sharp look-out for insects on the ground, and see the lids being pulled down by the spiders inside, or, again, just to catch a sense of movement in a certain spot, and rush forward expecting to see some insect, and find—nothing! And very careful scrutiny of the spot, as a rule, is needed to locate the "door." It is surprising how quickly these spiders race across the ground, jump into their holes, and close the doors behind them. To what cause is this remarkable habit attributable? If it is really a habit developed from the blind instinct of self-preservation, then I certainly think that wasps must have been the enemies most dreaded. But we were too early in the season to see those interesting insects at work.

I found a most remarkable piece of work done by one of these spiders beside the railway line. The gangers had been cutting out some rotting sleepers and had thrown them beside the line. On turning over one piece I noticed a large female Wolf-spider. She was in a defensive attitude, in a small, round chamber, much as there is at the bottom of a tunnel from a trap-door, but there was no apparent exit. I could detect no means whereby she could leave her retreat, so I carefully replaced the log, and searched all around it for the exit, but still without success. I then raised the sleeper on its side again, and looked underneath. Ah! There it was! Straight over the spider was the pin-hole for bolting down the rail, but, looking up the hole, I noted the light was not visible through it, as is usually the case. So I looked along the top, but failed to see the "door," and it was only after pushing a twig through the hole and opening the "door" that way, that I could be sure of seeing it. Where the hole had been made, there was a small ridge on the sleeper, and this had been carefully carried across the "door" by the spider. Was this merely blind instinct? Everyone must know, or can imagine, the splintery appearance of an old sleeper. Well, this had been imitated to a nicety, and the Mallee red dust had fallen on it and completed the work of this master craftsman.

Around the camp a few Carabids were taken, including *Euryscaphus dilatatus*, Muel., *Cacnum cordipenne*, Sl. (one was taken from a burrow nearly three feet in length). *C. elegans*, Muel., *Coratulus semiviolacea*, Cast., and *Sartorius dizoni* Sl. Beating the flowering Mallee, we obtained comparatively few beetles; still two good species of *Stigmodera* were obtained by this means, *Stigmodera moribunda*, Bl., and *S. signata*. The *Leptospermum*, as usual, proved better, and from it we obtained *Stigmodera vittata*, elongatula,

elderi, *octaspilota*, *argillacea*, *cyanicollis*, *amphichroa* and *aneicornis*. Of these, *argillacea* is probably the prettiest, with its coppery thorax, which is margined with yellow, the wing-cases pale reddish, with blue markings. It is close to *octaspilota* in markings (but not colour) and outline, but the apices of the elytra are distinct, much as in *elderi*. Other beetles taken here were a few Clerids and Malacodermis; among the latter was a new *Hypattalus* (but as it is a female it will have to stand over) and *Metriorrhynchus occidentalis*, Blkb., which was "new" to me. Some beetles occurred in great numbers, particularly certain of the small weevils, Chrysomelids and Anthicids. The Calytrix had very few beetles on it—a few small species that were common on anything; but one pretty exception was *Aonychus hopei*, a beautiful little weevil, with patches of pure white scales.

Each day a visit was paid to one of the sand ridges, and here we did better with the flower-frequenting beetles, especially on the *Leptospermum*, which grows much more freely on the sand ridges than on the flats. From this we took four species of *Melobasis*, viz., *purpurascens*, *fulgurans* (several varieties), *cuprifera* and *gratiosissima*, the majority of the last-named species being very fine, large specimens. *Fulgurans* and *gratiosissima* were both very lively, and it was almost useless to use the umbrella for them, as they flew off almost before touching it; so picking them off the flowers had to be resorted to. A few longicorns were obtained here, such as *Uracanthus albus*, *U. discicollis*, *U. strigosus*, U.sp.; *Triticosmia paradoxa*, *Eroschema poweri*, and *Atesta*, sp.

Up on the sand ridges the *Hakea* was coming into flower, and on this we took *Stigmodera jekeli* and *S. robusta* (?) *Stigmodera attricollis* was taken from *Hakea* and *Leptospermum*. From a small *Cassia* I shook three specimens of a weevil "new" to us — *Evas crassirostris*, Pasc., previously recorded from South Australia only. Shrubs of several species were persistently shaken, as it was thought they must produce something; but in several cases without result. A number of young "Ming" trees were shaken in the hopes of getting one of the species of *Curis* that have been taken on this plant, but the only result in each case was a shower of small weevils.

In the big sand-ridge country, half a mile from the Siding, there are plenty of kangaroos, and their tracks were to be seen in every direction. Birds were more numerous here than on the flats, but I do not remember seeing any species that is not known down south, with the exception of the Lowan, *Leipon ocellata*, and the Crested Bell-bird, *Oreoica gutturalis*. The latter, of course, was heard everywhere. On the edge of

the sand-ridge country were a number of nests of an ant, *Euponera lutea*. They were searched diligently, but did not produce much material. Crickets and cockroaches could have been had in plenty, but a shortage of bottles prevented the collecting of these, or spiders, in any number. The only beetles taken with this ant were *Eupines flavoapicalis*, Lea., *Tmesiphorus formicinus*, Mael., *Rhyaxis electrica*, and *Caloderma*, sp. While in a nest of a small black *Iridomyrmex* I found a real prize, *Extrephokingi*, described from Western Australia, but previously taken, one specimen each, by Messrs. H. W. Davey and J. C. Goudie, at Sea Lake, Vic. This little beetle belongs to the Ptinidae, and is of a reddish chestnut colour, with a broad, jointed antennæ. Another good find was the Ptinid, *Polyplocotes carinaticeps*, Lea, in the nest of the ant, *Cremastogaster læviceps*. This beetle was also described from Western Australia, and is now first recorded from Victoria. Two other good inquilines that were taken with *C. læviceps* were *Articerus cremastogasteri*, Lea, and *Nepharinus goudiei*, Lea.

In a nest of the Wood Ant, *Iridomyrmex nitidus*, I obtained a species of *Articerus* which I had long wished to possess—*A. constricticornis*, Lea, a small Pselaphid, with a single (visible) joint to the antennæ. This one joint is of a remarkable shape, being constricted in the middle, but the outline varies with the surface and angles from which it is seen. Not far from this nest I took another Pselaphid new to science, *Neopulimboldus goudiei*, Oke (M.S.S.). It is close to *Pulimboldus*, but the maxillary palpi differ in being longer, with the joints thin at their base. The male is without armature on the legs, which also is at variance with the described species of *Pulimboldus*.

Tuesday evening rain began to fall—a passing shower, we thought—but it was after 8 a.m. next day before we could leave our tent. Steady rain all night, and we had only a light calico tent and our umbrellas. These latter we put up in the tent, and they kept us dry for some time. However, before 10 p.m. I was damp, and an hour later wet! Rain had filled the channels all around the tent, and I thought that we would float off, but morning found us still there, and the sun breaking through the clouds. That evening, as it threatened to rain again, we struck tent and made a camp under a tarpaulin from one of the trucks. It was well that we did so, for rain fell incessantly through the night. We determined to leave Gypsum, and 4 a.m. found us packing up. We caught the morning train for Hattah, which is 36 miles further on. Arriving, we were surprised to find that here

there had been only a light, misty rain, but, as it looked rather threatening, we decided to stay near the station for a couple of hours. I made off down the line to a patch of scrub, and was soon digging out a *Carcum* burrow, whose occupant proved to be *G. elegans*.

Under a small stone I found a nest of *Tridomyia* sp., and was fortunate to get two specimens of a new Pruid, which I have named *Polyplacotes apicalis*, Oke (M.S.). It is rather like *Diplocotes foveicollis*, Oll., in the body, but the antennae has only 9 joints, and the eleventh is very large. Not far away, in another nest of the same species of ant, I caught two specimens (♂ ♀) of *Diplocotes* (*Dreem-placotes*) *strigicollis*, Lea. This beetle has only 10 joints in its antennae.

About 10 o'clock we started to walk out to Lake Hattah, a distance of 3½ miles. Some very interesting country lies between the Hattah Station and the Mildura Road, and it was only by the promise of a full day along this track (a promise not fulfilled) that I was persuaded not to wander off into the scrub. However, a little collecting was done. The results were rather disappointing, the only beetle worth taking being a specimen of *Relus flindersi*. There is a great variety of vegetation here, and this should be good insect country all the year round, but especially in the early spring, when the various *Acacias* are in bloom. The only shrubs we found in flower were three species of Mallee and *Myoporum platycarpum*. Several bushes of this latter species were shaken into the umbrella, but the only beetles obtained were *Monolepta divisa*, Blkb., *M. modesta*, Blkb., and *Ditropidus apicipennis*, Lea.

It had been arranged that we would stay with Mr. Alf. Jones, a friend of Mr. Dixon, who is the only resident right on the lake, with the exception of Scotty at the pumping station, which supplies water to the railway station and residents in Hattah. When we were there Mr. Jones had his camp almost within a stone's-throw of the water in Lake Hattah. On the other side of the camp Lake Brookie was only a few hundred paces away, and, straight in front about a quarter of a mile, was Little Hattah. In dry weather they are distinct lakes, but in flood are all joined together.

Around the lakes is a fringe of River Gums, and on the flat between and around Lake Brookie are a few Black Box, but these, like most of the vegetation, seem to be dying out. This is particularly the case with the Hop Bush and the Moonah. Of the latter only a small clump of six or seven fair-sized bushes remain; of the former, not a bush was found near the lakes, and yet both species grew plentifully a few years ago! Is it not the same everywhere? The vege-

tation is killed, and no young shrubs or trees grow to take the place of those destroyed. The beetles collected at Hattah might be divided into four groups: (1) Those taken at the water's edge; (2) those taken on the flats around the lakes; (3) those taken out in the Mallee scrub; and (4) those taken in ants' nests.

Naturally enough, after the dryness of the Gypsum sandridges, the water attracted us at Hattah, and we spent our first day as well as several half-days there. As was expected, the most numerous in species and individuals of the beetles were Carabids. Some kinds well known around Melbourne were among the most abundant here, viz.: *Platynus marginellus*, Er.; *Chlaenius australis*, Dej.; *Mecyclothorax ambiguus*, Er.; and *Cutadromus lucardairei*, Boisd. Other species common enough here, but unknown in the Melbourne district, were *Ichtyisternus limbatus*, Mael.; *Chlaenioidius metzgeri*, Montry.; *Pheropsophus verticilis*, Dej.; *Cutadromus latro*, Tsch.; and *Bembidium jacksoniense*, Guer., while only one or two specimens of the following were taken: *Eathenus morquensis*, Bkbb.; *Amblystomus ovalis*, Sl.; *A. parvus*, Bkbb.; *A. latus*, Bkbb.; *Mecyclothorax curtus*, Sl.; *M. parvulus*, Sl., and *Loxandrus australiensis*, Sl. A few Staphylinids were taken along the water's edge, including *Ateuchus seminudus*, Pol.; *Philonthus subcingulatus*, Mael.; *Thyreoxenus chalcoplerus*, Erichs., 'T', sp., nov.; *Pinophalus aciciventris*, Pol., 5 sps. of *Lathrobium*, 5 sps. of *Scymnium*, and *Damene torrensensis*, Bkbb., not hitherto recorded as Victoria. Water-beetles were scarce, and only four sps. of Hydrophilids were obtained. Psephenids also were scarce, and only four species were taken: *Eupinoda* sp.; *Oreoxenus longicornis*, Lea., and two other undetermined species.

Several of the forms mentioned were found only at one point—on Lake Brookie—where mild flood conditions existed. Had we collected at this point on our first day we would probably have done much better than we did. As it was, we tried for a while on the second day, and gave it up as the day was too windy. I did not try there again until the day before we left, and by then the beetles were considerably reduced in numbers. I think this was due, principally, to the number of Geckos and Scorpions that had concentrated around this spot. Every stick or piece of bark seemed to be harbouring at least one scorpion. Under one piece of bark, about 18 inches in length and five or six inches in width, there were seven of them. They were a fairly small species, of a dingy, yellowish colour, variegated with black spots, and were probably *Isometrus maculatus*, De Geer.

In the next group—those taken on the flats—Carabids was well represented here also. The largest species found

was *Philoscaptus tuberculatus*, Macl. This is a very fine insect, 1½ inches in length, jet black, with rows of small tubercles on the elytra. The jaws are very powerful-looking, and the front legs are well adapted for digging. It is usually found sitting in the entrance to its burrow, which is only four or five inches in length, under logs. Two specimens of *Geoscaptus cactus*, Macl., a brilliantly-polished species, somewhat like *Carenum scaraphites*, Westw. Undoubtedly the most showy Carab we found here was *Eutomus tinctillatus*, Newm., of which we secured several specimens in two distinct sizes—20 mm. and 14½ mm. Looked at from one angle these specimens are of a beautiful violet hue, but when seen from another angle they appear a bluish-green.

The rarest find in Carabs for the trip was *Trichocarenum custelnani*, Sl., a single specimen of which I found sheltering under a chip of wood—without a sign of a burrow. This interesting species was described as from Roebuck Bay, Western Australia, from a single specimen in the French collection, and my specimen is, apparently, only the second one to be taken. A specimen of *Mecyclothorax lateralis*, Cast., was taken under some rubbish, as also were some *Simondantus mandibularis*, Sl. Two species of Paussidæ were taken—*Arthropteris wilsoni*, Westw., and *A. westwoodi*, Macl.—under cover on the ground, but never in ants' nests. The latter species was not uncommon, and one was taken in the scrub, two miles away from Lake Brockie. A few interesting species of Tenebrionidæ were found occurring on these flats, including species of *Pterohelaeus*, *Helæus*, *Saraqus* and *Adelium*, *Hypaulax orcus*, Pasc., and several species of *Chalcopteris*.

Another good "find" I made here consists of a pair of *Metriorrhynchus apterus*, Lea. They were taken on a log, and on opening up the log several pupæ were obtained. Unfortunately these did not emerge properly. This interesting insect is, as its name implies, wingless in the ♀. The ♂ is, I believe, still undescribed. I obtained a single ♂, which may belong to this species, as it was taken near this log, but it is winged. This species was described as from the Darling Downs, in Queensland, and I am not aware of its having been taken elsewhere, so this is an interesting extension of its habitat.

The Black Box was well worked, and several nice weevils were obtained from it, including *Oxyops bilunaris*, *O. alphabetica*, Lea., *O. sp.*; *Bryochus squamicollis*, Pasc.; *Rhinaria tibialis*, Blkb.; *Haplomys spenceri*, Gyll.; *H. fasciculatus*, Bok., and a variety of *H. sp. nov.*—structurally near *longipilosus*, Lea. The River Gums were much too high for us

to discover what might be on the foliage, but every piece of loose bark within reach was stripped off. The only beetle that was at all common here was *Diphobia familiaris*, Oll., and they were both with the ants and under bark, or on the ground by themselves. A few Carabæ were taken, but very sparingly—*Adelotopus cylindricus*, Ch.; *A. aphodioides*, Westw.; *A. micans*, Blkh.; *Sarothrocrepis sauvai*, Blkh., and *Anomotarus minor*, Blkh. Amongst other families were a Clerid, *Lemidia rufa*; a Chrysomelid, *Monolepta arida*, Lea., and a Ptinid, *Ptinus* sp., near *medioglaber*, Lea.

Only three trips were made back into the Mallee scrub proper one being to some large sand ridges about two miles away; the second, around and beyond the pumping station and out onto the Mildura road; and the third to some paddocks that had been "rolled," and then left. This latter was a most interesting day's collecting. As the morning was bright and warm, an early start was made, the way being over the undulating land, covered with white everlasting, towards the Mildura road, up the slope to "Wilson's Selection," through the Pine and Bull Mallee belt, and on into the scrub. Though the idea was to get to the rolled paddocks as quickly as possible, and not to loiter on the way, we had not left the camp three minutes before a log was noticed that had not been turned over, and, of course, we could not resist the temptation of having a look underneath it. And so it continued. A specimen of *Eutoma tinctillation* under one log, a *Helocus* under another; perhaps a Termite's nest, or a nest of some ant would be revealed and searched through for "guests." Here, in a Termites' nest, I found a few specimens of an apterus Staph, belonging to the sub-family Aleocharinae, which, Mr. Lea informs me, is viviparous. It is a pretty little thing when alive, with its head, prothorax and elytra a dark wine colour, and the abdomen and appendages much lighter. It is very quick in its movements, and is apparently on the best of terms with its hosts. It is probably new to science, but has not yet been fully worked out.

On the rise are some Myalls, and from these a few weevils were obtained, while the leaves underneath were smothered with a small species of ladybird. Every few steps there was something to do: a log to be turned; some bark to be stripped; some boughs on the ground to be shifted; or some bushes to be shaken into the umbrellas. That nothing may escape being taken, a collector has to try everything, and every way he can think of. Here, and in other parts, we found quantities of a Mallee in flower, I believe, the Yellow Mallee, *E. incrassata*, on which hardly a beetle was to be found. The Mallee in question has large clumps of flowers, which are of

a decided yellowish colour, and the individual flowers, as also the leaves, are rather larger than usual. The flowers emit a strong, overpowering smell of honey, and, after beating a quantity into the umbrella, the inside surface becomes so sticky that it is necessary to wash the umbrella. And yet hardly a beetle, or bee, will go near the plants. I do not know the reason, but there must be something unpleasant in the taste of the nectar.

Shaking the shoots around the stumps of some Bull Mallee we obtained some nice Chrysomelides, *Cryptocerphalus metallica*, Lea; *C. scabrosus*, Oliv., var. *rufifrons*, Chp., *C. sp.*; *Cadmus histrionicus*, Chp., and a few species of *Paropsis*. While shaking a clump of shoots I obtained a pair of small weevils that I thought were "new" to me, and I spent over half-an-hour trying to get more, but only obtained one. Imagine my disgust when, later, I found that they were only the Grain Weevil, *Culex granaria*! From a young piece of the white Mallee I obtained the green caterpillar of the rather rare moth, *Hyloera eucalypti*, and this was subsequently bred out. What a change in colour! The caterpillar is a beautiful eau-de-nil with a white stripe down the sides; the pupa black, and the perfect insect is a fine study in browns, which, on the forewings, are intricately interwoven; the hind wings are pearly white with yellow-brown margins.

On reaching the "rolled" Mallee we tried everything, though the "spring-backs" were our main objective, and, from these, we obtained some beautiful species of *Paropsis*. But how disappointing these beetles are! One we caught was a large species of a beautiful soft shade of green. Within a month it was a dingy yellow. Another with a green band around it, and red and golden markings faded too. It is a great pity that these beetles will not retain their colours. Here we obtained *Pterohelacus thymaloides*, Mael., and three species of Longicorns—*Attestra angasi*, *Rebius filiformis*, and *Ischnotes bakewellii*. By one o'clock the sand had become so hot that it almost burnt the hand when touched. We decided to have lunch. For a drink we went over to Wilson's tank. It contained only a few inches of mud, so we selected the nearest approach to a shady spot that was to be found, and lunched without water.

A few stunted *Myoporums* and a little White Mallee were the only flowers we found on resuming work after lunch. On the former were a few *Anilaria*, and a single *Pseudanilaria purpuricollis*, which may be its usual time here, but some that we bred out of sticks at home did not appear till February. The *Leptospermum* was just about finished at Hattah, and what little was left had very few

Stigs on it, and only one was added to our list—*Stigmodera gibbicollis*, Saund. About 4 p.m. a start was made for camp, and, striking through the scrub, we returned by a different route. On the edge of the scrub I took a specimen of that very interesting longicorn—*Microbragys mormon*, Case. This longicorn looks very like one of the short-snouted ground weevils that has grown long antennae.

The fourth group of beetles—those taken in ants' nests—provided more interest and took longer to catch than might be thought by taking a casual look at our "catch." For though they are mostly small, there is usually something of special interest in each species. For example, take *Thorictosoma tibiale*, Lea, of which I collected a few specimens in nests of a small black *Iridomyrmex* in the sand-ridge country. This beetle, which is 2½ mm. in length, belongs to the Tenebrionidae, is without eyes and wings, and yet ranges from Geraldton, W.A., to Hattah and Natya, in Victoria.

Out in the sand-ridge country I obtained a few more specimens of *Malleocola myrmecophila*, *Diplocates strigicollis*, *Polyptocotes apicalis*, and another very interesting Ptinid, belonging to the Ectrephini, for which a new genus, or sub-genus, will have to be created. And as the antennae have only two joints, the second being wedge-shaped, I have called it *Bitrephes claviformis* (M.S.S.). I consider this to be one of the most interesting species of Ptinidae known in Australia. Though it might be a moot point whether the broadening of the joints—as in *Paussaphinus*—or the reduction of the joints from the usual eleven to two, as in the present species, is the more interesting. An intermediate position is occupied by *Ectrephes kingi* having the broadened antennae, but only five or six joints. *Articerus* were scarce at Hattah, but two specimens, (♂ ♀) of *A. dentipes*, Lea, were found with *Iridomyrmex rufoniger*, and several specimens of another species, not determined yet, but certainly new to Victoria.

On starting for this trip I determined to try to obtain two beetles that had been collected in North-western Victoria—*Pheidoliphala curba*, taken at Sea Lake from a nest of Pheidole, and *Camponotophilus fimbriicollis*, described from Beverley, W.A., of which Mr. Dixon had already obtained two specimens in nests of the common Sugar Ant, *Camponotus nigriceps*, at Hattah. Of the first, no sign was seen, though no effort was spared. Pheidole Ants were rather scarce, but those nests found were looked over most carefully and revisited several times.

Hunting for the second species proved the most interesting item of our whole programme. The ants swarmed over everything all around the lakes, and every bit of cover that

did not have a nest of some other ant under it, had a nest of these Sugar Ants, but it was not till the fourth day of our visit that I succeeded in finding one of the beetles. I had looked in 236 nests without finding a specimen! When I say nests, I do not mean that all were separate colonies. For instance, two pieces of bark lying on the ground, say a few feet, or even less, between, and covering numbers of these ants and the tunnels leading down to their nests, would show on the surface, no connection whatever, but underground would almost certainly be linked. Yet I would have counted these as two nests. And, again, some nests were looked in twice, a few three times, and these visits were counted in. However, on turning over a piece of wood, and exposing my 237th nest (we had both looked in this nest, but on different occasions), I was at last rewarded by seeing one of the long-coveted beetles.

Camponotiphilus fimbriollis, or, to give it its English equivalent, The Fringed-neck beloved of the Sugar Ants is a dark-reddish, chestnut beetle, slightly under half-an-inch in length, with a fairly conspicuous fringe of pubescence around the pronotum. Victorian specimens are slightly larger than the only two specimens I have seen from Western Australia. Mr. Lea gives the length as $8\frac{1}{2}$ - $9\frac{1}{2}$ mm.; my examples are $10\frac{1}{2}$ -11 mm. That the beetles live on very friendly terms with their hosts there can be little doubt, as the ants made no attempt to molest them. When nests are opened, the beetles are very lively, and immediately make for the tunnels. In their hurry often they will try to run between the legs of their hosts, resulting in the ants coming "croppers," which the ants apparently take in the spirit of "no offence meant." The ants often get out of the way of the beetles, and seem as anxious as the beetles themselves are to get out of sight.

Twice, on finding one of these beetles in a nest, and noting which hole it was making for, I plugged the hole, an inch or two down, with my trowel. The beetle dived into the hole, but could not get down, and then there was excitement! Several ants rushed into the hole, pushed their way around, came out, looked around, as though for fresh inspiration, and then rushed back again. Did they push the beetle out? Or did it come out of its own accord? On the first occasion I thought the beetle rushed out of its own free will; it ran towards another hole, when I picked it up and put it in the killing-bottle. On the second occasion it appeared to me that the beetle was forced out by the ants and directed towards another hole, in much the same way as a dog will drive sheep. Only, instead of one dog and many sheep, it was several ants and one beetle. I tried to

PLATE VIII



ALPINE HEATH, *Epacris barbarensis*,
Staph.



THE BAW BAW BERRY, *Wittstenia*
mucronata, F.v.M.

(Negatives by F. J. Bishop)

black the second hole, but the beetle was too quick for me. I tried to dig it out, but, on digging a small hole, such a labyrinth of passages were exposed that I was at a loss which way to proceed, and, as the clay was very hard for a trowel, I gave it up.

The time spent on opening the nests, before the first "Fringe-neck" was found, was by no means lost. Far from it! For other inquilines were seen and noted. Two other beetles were seen in the nests. One was a Staph., belonging to the genus *Conosoma*, but, as some specimens were obtained away from the nests, they may not be true inquilines. The second was a "new" Pselaphid, since described as *Tmesiphorus camponoti*, Oke. This species was not uncommon, but not many were taken, as I mistook it, in the field, for *T. formicinus*, MacL.

An unexpected guest to me, if not the ants, was a pretty little bluish spider, belonging to the family Attidae. Numbers of this spider were seen by both of us, but neither saw one outside of the Sugar Ants' nests. Several kinds of mites were noted, and a small yellowish fly was not uncommon. But the most interesting and peculiar guest was a kind of Froghopper (Cercopidae). All the species of this family hitherto known to me live on bushes, principally young Eucalypts, and live on the juices of these plants. Two species of this family, *Eurymola distincta*, Sign., and *E. rhombittata*, Am., are very common on young Eucalypt trees, where they are always attended by ants, particularly the Sugar Ants and Meat Ants, *Iridomyrmex detectus*. But we found this species living in nests under the ground, and, from what we saw, it seems very doubtful whether they ever leave the nests, except, perhaps, to change from one to the other. The insects were found in all stages, except the eggs. Little larvæ from slightly more than 1 mm. up to fully matured imagines were seen in the same nest, and the ants guarded them so carefully it would appear that they spent their lives in these nests—unless they are taken out at night to feed on the trees. Unfortunately, our acetylene lamp was damaged, being dropped off the train at Gypsum, and I was unable to do much observation work at night. I did glance around one or two nests at night, but did not see any froghoppers outside them.

That these froghoppers are used to being carried by the ants is evident. On rolling over the covering log from one of the nests sometimes a dozen or 20 of these guests will be revealed. They seem to be greatly agitated, and quite unable to make up their minds which way to run. Any ant meeting one of the guests will immediately seize it by the thorax and carry it down one of the holes. Or, if the

guest had been on the log, the ant would take it into any crack or crevice and hide it. The ants invariably carry the froghoppers off head foremost, and generally turn them over with their feet uppermost as soon as they take hold of them, if they do not, the froghoppers will force themselves over in the ants' mandibles. The reason for this is easily understood—it is because the froghoppers' claws catch in everything when turned down, but are not nearly so likely to do so in the reversed position. Did the ants of the froghoppers discover this fact first?

I greatly regret that I did not bring home many live specimens of ants and their guests. One might have been able to discover more about them, though I am afraid it would be necessary to have them in their natural surroundings to see some of the interesting details. It may be possible to learn whether the froghoppers are fed by the ants. I dug out one fine nest (covered by a log and a sheet of bark about 5 feet in length and 2 feet in width) to a depth of over 3 feet to see whether the guests could be obtained far down in the nest. As I had taken one "Fringe-neck" in this nest, I had hopes of finding more specimens of this beetle down in the nest. I was disappointed, but right at the bottom of the hole obtained one of the spiders and several froghoppers.

We brought back with us a bundle of sticks, and from these bred a few longicorns, including: from Mallee, *Scolacrobrotus variegatus*, Blkh.; from Aeacia, *Symphyletes lateralis*, Pasc., *S. vestigialis*, Pasc., *Platynonopsis obliqua*, Don.; and from Black Box sticks, *Atesta angasi*, Pasc., *A. latei*, Blkh., and *Atesta* sp. nov.

It was hard to depart from this delightful country, with its many interesting phases of animal life, but business demanded that I should return to the city, and so we had to make an early start on Saturday morning to catch the train at 8.22 from Hattah. Arriving at the station, with a few minutes to spare, I had time to try a few pieces of *Myoporum platycarpum*, which were out to perfection, and from which I obtained a single specimen of *Neocuris discolorum*—my last catch for the trip.

Altogether 364 species of beetles were taken, and I believe a few common species were passed over; but still I think we obtained a very fair number for 14 days' collecting. I am greatly indebted to Mr. A. M. Lea for identifying and checking my identifications of a number of the beetles obtained, and to Mr. T. G. Sloane for identifying many of the Carabidae and the Paussidae. To both I tender my best thanks.

TWO RARE NATIVE MOUNTAIN HEATHS.

BY EDWARD E. PESCOTT, F.L.S.

The heaths which we usually grow in our gardens are either species or hybrids of the native South African heaths, and belong to the family of Ericaceæ, the members of which are often called the "true heaths." The heaths which make the Australian bush and moorlands so gorgeously beautiful in winter and spring belong to the family of Epacrideæ. There are several botanical differences in the families, the main distinction between the two being that in Ericaceæ the anthers are always one-celled, and in Epacrideæ they are always two-celled. Representatives of both families are found in Victoria, but, while we may find more than 50 species of Epacrideæ, there are only two native species of Ericaceæ.

BAW BAW BERRY (ERICACEÆ)

The species illustrated, *Wittsteinia vacciniacea*, F.v.M., is known as the Baw Baw Berry. It is found only on the tops of the Baw Baw and adjacent mountains, and is therefore very rarely seen by plant lovers. A wood-block figure of this plant is given in Mueller's "Key," but it is very formal, and hardly shows the true character of the plant. The bushes grow to a height of two feet or three feet, and the delicate, greenish-white, waxy bells are exceedingly chinty. Unfortunately, the plants were not fruiting at the time the photograph was taken; the fruits are small, greenish-yellow or reddish in colour, and are classed as edible.

To the Ericaceæ belong the blue berries, huckleberries, and other edible berries so common in North America; they yield large crops of berries annually.

THE ALPINE HEATH (EPACRIDEÆ)

Epacris Burchardensis, Stapf, for many years was classified as *E. heteronema*, Labill., and under that name is described at page 378 of Mueller's "Key." It is purely alpine heath, growing fairly abundantly on the Baw Baws, becoming quite a tall plant, having white flowers crowded towards the top of the branchlets, as shown in the photograph. The localities of *E. heteronema*, as given in the "Flora Australiensis," page 239, are not only the Baw Baws, but Mount Aberdeen and the Mitta Mitta; records also showing it to occur in Tasmania and New South Wales.

In 1909, when studying a heath that had flowered at Kew Gardens, England, one of the botanists, Mr. O. Stapf, came

to the conclusion that *E. heteronema* was a very ill-defined species, especially as Bentham had stated that *E. dubia*, Lindl., might be a variety of this species.

As a result of Mr. Stapf's investigations, it was found that, while *E. heteronema* was a valid species, the Baw Baw specimens differed very considerably from the type description. Indeed, from all the plants known as *E. heteronema*, four separate species were described, the determination resulting in the exclusion of that species from Victorian Flora. The Buffalo and Mitta Mitta specimens were named *E. breviflora*, Stapf; the Tasmanian form was named *E. Stuartii*, Stapf; while the Baw Baw plant was named after the mountains on which it grows. This species was published in the Kew Bulletin of 1910, and its only locality is the Baw Baw Mountains.

The main differences between the two plants may here be noted for the use of the general collector. In *E. heteronema* the style is as short or shorter than the ovary, and it does not protrude from the mouth of the corolla; while in *E. Bawbawensis* the style is several times longer than the ovary; it is distinctly protruded from the mouth or funnel of the corolla tube. In the former the filaments which support the anthers are very much shorter than the anthers; while in the latter the filaments are much longer than in the former.

In the photograph reproduced, the protruding style can clearly be seen in the centre of some of the flowers.

The illustrations are from negatives by Mr. F. J. Bishop, whose beautiful photographs, which so truly delineate the characters of the native flowers, are widely known.

THE PROVIDENCE OF A THRUSH.

We often read of animals laying food aside for future needs, but I do not remember hearing of any bird doing so. Nevertheless, I once saw a Grey Shrike-Thrust, *Colluricincla harmonica*, thus provide for himself. The friendly bird came every day to our verandah for crumbs, and once, having evidently satisfied his hunger for the time being, he picked up a piece of bread, and, carrying it to a post near by, carefully pushed it under the edge of a sack which was hanging there. Fortunately, I happened to go to the door, just as, later in the afternoon, the Thrush returned for his food. Without hesitation, he flew to the post, and picking his bread from beneath the edge of the sack, he flew off with it. On another day he carefully pushed a large crumb into a cleft in a log. I did not see him return, but a few hours later the crumb had gone, and presumably he had taken it.—
J. GALBRAITH.

REGENERATION OF BURNT FOREST.

No records appear to have been published in this State of the effects of fires on our various types of forest, and of the measure of regeneration which has followed. The results of the many fires which have periodically devastated our timber resources are doubtless known to Forest officers, but nothing of a systematic kind has been made available for public information.

It is, of course, generally known that a forest suffers according to the nature and intensity of the fire and the kind of tree, or trees, and attendant species composing it. It is known, too, that the result of a fire, even if the trees are not killed, is to render them more vulnerable to borers, fungi, and other destructive agencies; that the humus is destroyed and the ground bared, with the consequent denudation of the soil by rainfall when the slope is great enough, to the detriment of both the forest and the streams draining it; that the constitution of the forest is invariably altered more or less, certain species being killed outright and afterwards replaced by wattles, bracken or others dubbed "fire-weeds."

To remedy, in some slight measure, this lack of exact information, it is proposed that two burnt areas, differing, if possible, in the nature of the cover, shall be selected for purposes of periodical observation and record by a team composed of members of the club.

In the first place, surveys of the burnt areas would need to be made, the immediate effects of the fire, the nature of the surface and the soil, the presence or not of humus, the altitude, slope and exposure, and the fauna and flora still existing noted. The date of the fire, and the dates and amount of the precipitation occurring in the interval, would be ascertained, and any evidences of regeneration recorded.

By an examination of areas adjoining the burnt area, its condition anterior to the fire would be ascertained, and a list of its fauna and flora drawn up with a reasonable degree of approximation. Subsequently, monthly visits by one or other member of the team might be paid, their observations being duly recorded, generally for the whole area, and particularly for certain specially selected quadrats.

The Botanical Department of the University of Melbourne has the intention to carry out similar work in the vicinity of Healesville, and our members will doubtless be glad to adhere to whatever scheme is adopted by it, and work on similar lines.

With the view of seeking suitable areas for the purpose mentioned, two members of the Club visited Upper Ferntree Gully on February 28, and provisionally fixed on one close to the station, which had been fire-swept on the 13th of the month. This measures roughly between 20 acres and 30 acres, and is bounded by three roads—that from the main road to the Pavilion; from there towards Ferny Creek, and the third, down which a telegraph line runs, joining these. With the exception of a small patch near the apex of the triangle, the scrub has been completely burnt, and a cursory examination enabled only *Goodenia ovata*, *Aescia verticellata* and *Glycine clandestina* to be identified.

Of the trees, *Eucalyptus elceophora* largely predominated, and *E. obliqua* and *E. australiana* were also present. Although all their leaves were dead, none of the trees appeared to have been killed, and these will doubtless recover, their bark having been only superficially charred. Already signs of recovery were evident in many of them in the shape of adventitious shoots at the bases of saplings and along their stems. Other signs of life were noticed in the tussocks of *Gahnia*, sp., and *lepidosperma*, sp. The fire had, seemingly, been insufficiently severe to consume the many logs which strewed the forest—perhaps relics of previous fires—and under these were occasional lizards, and numerous spiders, ants and froghoppers still alive.

The work proposed by the committee and the Botanical Department of our University will be a small step in the application of plant ecology to practical use. All whose business it is to grow things, be they forest trees, fruit trees, grain or other crops or pasture, put the principles of plant ecology into practice to a greater or lesser degree. Mostly, like the man who was surprised at finding he had been talking prose all his life, they are doing so quite unconsciously. They work empirically or by rule of thumb. Many succeed in spite of this, but it is very certain that, if they clearly understood the factors responsible for the growth of their crops, and the influences which militated against them, their success would be the greater.—C.S.S.

VICTORIAN FERNS

BY H. B. WILLIAMSON, F.L.S.

PART III.

Family POLYPODIACEÆ.

Key to the Genera.

- (a) Sori marginal
 - (b) Indusium absent *Notholaena*, 1 sp.
 - (b) Indusium present, sometimes not apparent on the old fronds
 - (c) Indusium short
 - (d) Indusium cup-shaped, opening outwards
 - (e) Fronds firm *Davallia*, 2 spp.
 - (e) Fronds tender *Dennstaedtia*, 1 sp.
 - (d) Indusium formed by the incurved margin of the frond
 - (f) Fronds 4 to 5 ft. *Hypolepis*, 1 sp.
 - (f) Fronds under 1 ft. *Cheilanthes*, 1 sp.
 - (d) Indusium an incurved reniform membrane developed from the edge of the frond, but distinct from it *Adiantum*, 4 spp.
 - (c) Indusium elongated
 - (g) Indusium opening outwards . . . *Lindsaya*, 2 spp.
 - (g) Indusium opening inwards
 - (h) Indusium double *Pteridium*, 1 sp.
 - (h) Indusium single
 - (i) Fronds dark green on both sides
Pteris, 4 spp.
 - (i) Fronds paler beneath
 - (j) Fronds bi- or tri-pinnate, 2 to 4 ft.
Histiopteris, 1 sp.
 - (j) Fronds simply pinnate, 1 ft.
Pellaea, 1 sp.
- (a) Sori away from the margin
 - (k) Indusium absent
 - (l) Fertile and sterile fronds dissimilar
Cyclophorus, 1 sp.
 - (l) Fertile and sterile frond similar
 - (m) Sori linear, along veins, very hairy plant
Pleurosorus, 1 sp.
 - (m) Sori covering most of the veins, fronds glabrous, very thin *Anogramma*, 1 sp.



—Notholaena; II, III—Davallia, IV—Dennstaedtia,
V—Hypolepis; VI—Cheilanthes.

DAVALFIA PYXIDATA, Cav. (Fig. III). Hare's-foot Fern, V., N.S.W., Q., P. This is a smaller and more tender fern, up to 1 foot in height, and may be distinguished from *D. dubia* by its indusium being a complete cup or cylinder, longer than broad (IIIc); when young almost immersed in the pinnule. There appears to be only one Victorian specimen in the National Herbarium—that from the Grampians. It has been recorded from East and South, and specimens would be acceptable at the Herbarium.

Genus *DENNSTADTIA* (Page 301).

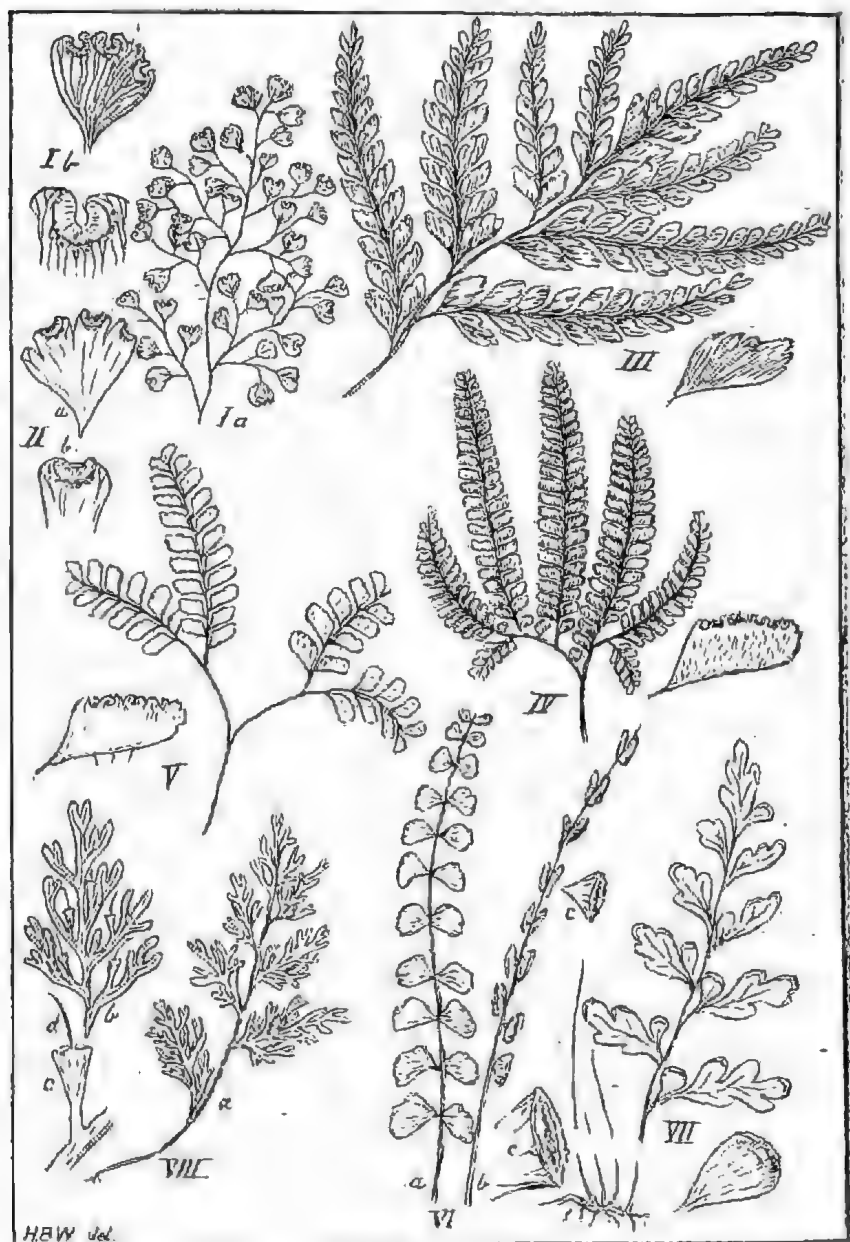
D. DAVALLOIDES (R.Br.), Moore (Fig. IV). Creeping Lace Fern, V., N.S.W., Q., As., N.Z. This is a beautiful fern with tender, much-divided fronds, up to 5 feet, springing from a rhizome, like bracken. It has its spore cases in a cup-shaped involucre with almost entire-edges set at the base of the upper sides of the very small teeth of the pinnules (IVb). It is common in the jungle-like creek bottoms of East Gippsland, and there are specimens from Johanna River, near Cape Otway.

Genus *HYPOLEPIS* (Page 301).

HYPOLEPIS TENUIFOLIA (Forst.), Burd. (Fig. V). Soft Hypolepis, V., N.S.W., Q., As., P., N.Z. This fern bears a remarkable resemblance to the common *Dryopteris punctata*, and, when the indusium has withered, can scarcely be distinguished from that fern. It has fronds springing from a rhizome to a height of 4 or 5 feet, somewhat resembling *Davallia dubia*. The sori are at the edge of the pinnules, between their teeth, and the indusium consists of the reflexed scale-like margin of the pinnule (Vb), at first often covering the sorus, but at an advanced stage almost concealed under it, or quite withered away. There are specimens in the Herbarium from few Victorian localities: "Curdie River," "Otway," and "Raymond Creek."

Genus *CHEILANTHES* (Page 301).

CHEILANTHES TENUIFOLIA (Burm.) Sw. (Fig. VI). Rock Fern, all States of Australia, As., P., N.Z. This species is found in all parts of Victoria, and is sometimes seen thickly spread over granite hillsides under conditions which one does not usually associate with ferns, with the exception of the Bracken. The fronds grow to almost a foot in height, and the edges of the pinnules are revolute to form a cover for the sori, which are sometimes contiguous, with the small rounded teeth or lobes bent over them.



I to V—*Adiantum*. VI, VII—*Lindsaya*. VIII—*Trichomanes*.

Genus ADIANTUM (Page 302).

ADIANTUM ÆTHIOPICUM, L. (Fig. I). Common Maidenhair, very widely spread through every continent and the islands of the Pacific. Although found growing under ordinary conditions in scrub land, it is a favourite on account of its fairy-like appearance, due to the capillary stalks of the pinnules. It is the only one of the four species which has its pinnules not dimidiate (obliquely set on the stalks). It belongs to a section containing the old-world *A. capillus-Veneris*, "True Maidenhair," which has been erroneously recorded for Victoria in Supplement 3 to the Census owing to an error in determination by the late Prince Bonaparte of specimens of Victorian forms of *A. æthiopicum*. Illustrations of the pinnules of *A. capillus-Veneris* are given for comparison (Tab). It will be noticed that the pinnules are rather deeply lobed, and that the indusium extends further along the edge than in *A. æthiopicum*.

A. FORMOSUM, R.Br. (Fig. III)| Giant Maidenhair, V., N.S.W., Q., N.Z. The fronds are large—up to 3 feet—with shiny black stems, while its pinnules are almost leathery, finely streaked, and minutely toothed at the upper edge. Its secondary pinnae have hairy stems. It is found only in East Gippsland, where it grows thickly on periodically-flooded river alluvial. The author has gathered it at Cann River.

A. HISPIDULUM, Swartz (Fig. IV). Rough Maidenhair, V., N.S.W., Q., and all other parts of the world, except Europe. This fern also has been gathered only in East Gippsland. Its fronds are pedate (foot-like), having a fancied resemblance to the foot of a bird, instead of being pinnate, as in the two latter species. The pinnules are distinctly dimidiate, closely set, finely toothed, and hispid with short hairs on the under-surface. It has been collected only in the extreme East, Genoa River (Rev. A. J. Maher) and Cape Howe (C. Walter).

A. DIAPHANUM, Blume (Fig. V). Filmy Maidenhair Fern, V., N.S.W., Q., As., N.Z., P. The fronds are pedate, under one foot, as in the last species, from which it can be distinguished by its membranous pinnules, fewer sori set deeper from the edge, and the few minute black setae (stiff thorn-like hairs), on the longer edge of the pinnule. This last is quite a characteristic feature. It is remarkable that this fern has been collected only once in our State, and that within 50 miles of Melbourne—Lang Lang River, 10 miles west of Dronin. (C. French, senior, 1884.)

Genus LINDSAYA (Page 302).

LINDSAYA LINEARIS, Swartz (Fig. VI). Screw Fern, all States of Australia; P., N.Z. This little fern is common among scrub near Melbourne, especially in damp, sandy soil. Its sterile fronds (a) growing usually 6 inches to 8 inches in height, are simply pinnate, the pinnae being fan-shaped and opposite. The fertile fronds (b) have sori in a continuous line under an indusium opening outwards on the outer edge of the segment. These fertile segments are often found folded or screwed up, hence the vernacular "Screw Fern."

L. CUNEATA (Forst), C. Chr. (Fig. VII). Wedge Fern, Tas., V., N.Z. The fronds are 6 inches to 8 inches in height, bipinnate, with pinnae about an inch long obovate or cuneate, having sori and indusium much like those of *L. linearis*. This fern was unrecorded for Victoria until Messrs. Audas and St. John collected it near Sealers' Cove, Wilson's Promontory, in October, 1909.

ADDITIONAL NOTES.

TRICHOMANES CAUDATUM, Brack. (Fig. VIII). Tailed Bristle Fern, V., N.S.W., Q. The specimen of *Trichomanes* mentioned in Part I, p. 223, Mallacoota, C. Barrett, proves to be *T. caudatum*; new for Victoria. It differs from *T. humile* in having pinnate fronds (a). One of the pinnae is shown (b). The fruit-cups (c) are much like those of *T. venosum* in shape, with the similar long, but often thicker, receptacle (d). It was gathered well this side of the border, pendent from the trunk of a fern.

TRICHOMANES HUMILE. Another scrappy specimen—with no date or collector's name—has come to light. It is one from Gembrook, the locality of Mr. Lucas's specimen. Collectors visiting Gembrook should search carefully for this rare fern.

ALSOPHILA REBECQUE, F.v.M. Part I, p. 226.

From particulars supplied by Mr. C. French, senior, who knew Mr. Sayer well, and who, with Baron von Mueller, went through all that collector's specimens, it seems certain that the record for Victoria is erroneous. This tree fern is very distinct, and no authentic record exists of its occurrence in Queensland, S. of Rockhampton, or in New South Wales. The mistake has evidently occurred through a labelling error.



IN DEFENCE OF YOUNG.

It is perhaps not unusual to see birds defending their young, but a contest between a Hawk and a pair of Magpies recently at an altitude of 5500 feet gave us some entertainment in the early morning close to Mount Painter, N.E. Victoria.

A pair of Magpies, *Gymnorhina leucanota*, and their young were foraging on a flat among the "grasshoppers," *Timedras* and *Monistrias*. A hawk of some species skimmed low and tried to cut off one of the young birds. Immediately came a warning note from one parent, and the young magpies closed in. Again the hawk swooped, but the old bird was waiting, and rose to meet its enemy with a sharp snap of the bill, pursuing the hawk into a neighbouring tree. The patience of the hawk was admirable, and the Magpie returned to its family by a pretty, graceful curve.

In due course the hawk came again at its quarry, only to find a defender waiting. Five times the hawk swooped unsuccessfully. What a quick eye the parent bird had, and how confident were the young ones, which ran about feeding, oblivious of the enemy. One of the parents remained on the ground all the time with the fledglings, while the other was ready to accept the challenge. To us, from a distance of 100 yards, the Magpie seemed to rise first, and anticipate the hawk leaving the tree-perch.

Both birds remained on the same tree for some time after an attack, evidently, like practised prize fighters, waiting for an opening. When the Magpie deemed it prudent, he returned to the home circle, till the hawk resumed its quest. Finally, the Magpie family flew to the wooded country near the hut, the parents on the outside and the young ones inside; but the foiled hawk remained for some time on the tree, having abandoned the hunt. Some time later the cries of the young Magpies among the tree-tops showed that food was being brought to them.—A.J.T. and A.G.H.

RUFOUS-BREASTED WHISTLER AS A MIMIC.

Mimicry is practised by some birds to whom that power is not usually attributed. Often the imitation is not deceptive, or is so only for a moment. At other times the strain is perfect. I noticed an example of this at Lake Kerferd, near Beecleworth, in November, 1924. While following a pair of Robins, *Petroica goodenovii*, through the scrub, I heard a Grey Thrush, *Colluricincla harmonica*, call clearly several times. The notes were unmistakable—"Oh-I-am-dear-Boyee"—yet with each repetition I became more doubtful. The strain was perfect, the pitch exact, yet an indefinable difference in the quality of the notes sent me in search of the singer. He was soon found, and proved to be no Thrush, but a Rufous-breasted Whistler, *Pachycephala rufiventris*. A moment later he broke into his usual clear call—"Euricla, euricla, rick-rick-rick"—and did not, that I heard, again repeat the Thrush notes.—J. GALBRAITH.

SOME BIRDS OF THE MOUNTAIN TOPS.

A friend, who is used to the plain country, once expressed surprise that Crows were to be found on the summit of Mt. Feather-top. During a short stay at an elevation of between 5000 feet and 6000 feet above sea level, in the early part of February, we were interested in noticing some of the birds that inhabit these high altitudes. No doubt some, or most, of them advance to the highlands as the climate becomes drier down country, and in the same way leave the highlands in the autumn, as the weather grows colder.

Although we did not see Emus, it is common knowledge that they frequent the Fainter High Plains at 5600 feet. We saw at 5500 feet as many as 200 birds in a flight of Crows, and could not understand why the carcass of a beast was left untouched for more than a week, close by. Hawks were common. In one place on the High Plains, at 5800 feet, four circled over us for a long time, while we endeavoured to find a reason; but eventually the birds were driven off reluctantly and watched us at a distance from their rocky perch. Eagles were seen soaring higher than the highest mountains, 6100 feet, but never two together. Plover twitted during the day at 5800 feet.

Many Quails were seen, singly, in quick, short flight, at 5600 feet. A brace of Ducks rose from the Kiawa River, in the Pretty Valley part of the High Plains, at 5500 feet. Pipits, *Anthus australis*, were frequently met with at 5900

feet. Flame-breasted Robins, *Petroica phænicea*, were at home resting on the roof of our hut, or on that of an adjacent shed, at 5500 feet. Crimson Parrots, *Platycercus elegans*, were present in groups, feeding noisily on the seeds of Snow-gums, at 5700 feet.

Clumsy Gray Bell-magpies, *Strepera versicolor*, made themselves heard, as usual, with their "Chock, Chock" calls through the timbered country, at 5600 feet. At 5600 feet a large, grey, heavy, silent and shy bird, that seemed ever on the watch for our approach, but never uttered sound, flitted quickly and noiselessly from tree to tree, hiding itself in the same coloured dead Snow-gums. Again at 5500 feet there was a brisk, merry little bird which warbled, but kept out of our way as we followed to observe. It frequented the tree branches of the smaller Snow-gums, and was as large as a sparrow.—A.J.T. and A.G.H.

AUSTRALIAN INSECT-GALLS.

Dr. Van Leeuwin, Director of the Botanic Garden, Buitenzorg, Java, who visited Australia to attend the Pan-Pacific Science Congress in 1923, was much interested in galls of native trees. While the Congress was sitting in Melbourne, Mr. C. French, junior, and Dr. Leeuwin visited Sandringham, Cheltenham and Diamond Creek, in search of insect-galls, and collected a number of undescribed species. In a recent publication, "Revista Internazionale de Cecidologia," vol. 21, 1924, most of these galls are illustrated and described. The publication is in the library of the Government Entomologist, Science Branch, Department of Agriculture, Flinders Street, Melbourne, where anyone interested in these most remarkable insects are at liberty to consult it. The galls were found principally on *Banksia*, *Persoonia*, *Casuarina*, *Eucalyptus*, *Acacia*, *Cassia* and *Leptospermum*. The paper forms a valuable contribution to the study of galls.

The Editor invites members to contribute nature notes suitable for the Field and Study Section of the *Naturalist*. Paragraphs recording personal observations are most desired. Each issue of our journal might contain four or five pages of notes.